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PLEASURE BOAT COLLISION EDUCATION

FINAL REPORT

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MAY 1978

Prepared for

U.S. DEPARTMENT OF TRANSPORTATION
United States Coast Guard
Office of Research and Development
Washington, D.C. 20590

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16. Abstract

The Coast Guard has undertaken research to identify educational alternatives in its long term efforts to improve the safety of recreational boating. Other organizations involved in boating safety education may find the illustrative approaches valuable in designing their boating safety education efforts. This project deals with educational solutions to pleasure boat collision accidents. The intent of the project is to establish educational content and methods that address the more serious collision accident causes. These major collision accident causes have been identified, and demographic characteristics were determined for operators of boats involved in the more frequently occurring accidents. Educational program objectives, program message content, delivery systems and considerations for execution of the program are being recommended. This program principally utilizes electronic and print mass media, and formal boating courses for dissemination of educational materials. The materials and concepts developed as educational intervention for collision accidents are identified in the video tape supplement to the Educational Alternatives for Boating Safety Programs, 1978. It is understood that any use of the materials and concepts in an actual educational effort would be strictly voluntary on the part of the educating agency.

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METRIC CONVERSION FACTORS

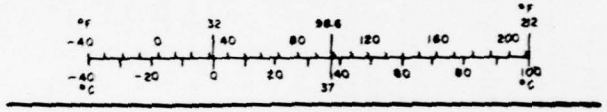
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures. Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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PLEASURE BOAT COLLISION EDUCATION

1.0 PART I - INTRODUCTION AND OBJECTIVES FOR THE COLLISION ACCIDENT EDUCATION PROGRAM

There is a growing concern for improving the quality of recreational boating, with a great deal of attention currently being focused on boating safety. One major approach to safety involves education of boaters to better qualify them for the task of operating their boats. Prior analysis of recreational boating accidents has identified two major accident types as causing the highest number of personal injuries and highest number of fatalities. These are collision accidents and loading related accidents, respectively. This report deals with the problems and information necessary to implement an educational program for the various types of collision accidents. The second accident type, loading related accidents (capsizings, swampings, and falls overboard), is dealt with in another separately funded project. Both projects are related to a third separately funded project dealing with educational alternatives for boating safety programs. The joint purpose of these three projects is to establish boating accident causes which have potentially high benefit for educational solutions, and to determine various ways and means for presenting educational countermeasures.

1.1 Determination of Potential Benefits for Educational Programs

The potential benefit for a given educational program is contingent upon the number of accidents and/or fatalities that can be directly addressed by the messages in the program, and upon the financial costs to disseminate those messages. It is logical that in order for a program to justify its costs, the accidents to be addressed in the messages should have high frequencies of occurrence in the boating population or should have a large number of fatalities associated with the accidents. In other words, there must be good reason to commit to an educational program for a specific group of accidents. However, in order for educational efforts to have any effect on the ongoing occurrences of the accidents, the accident type must involve boat operator decisions or behavior that are in error or in someway ineffective in preventing accidents or fatalities. An accident type that occurs as a result of circumstances that no operator can predict and reasonably avoid would be an unproductive selection for an educational program. The effect of

education should be to provide boaters with information for identifying the presence of dangerous circumstances, and for deciding how to deal with those circumstances; further, education should provide boaters with behavioral alternatives for implementing the decisions. *Therefore, the challenge of this task is to identify accidents where known alternative actions on the part of the boater could have prevented the accidents or fatalities, and to explore resources that will provide boaters with access to those alternative actions.*

One major problem in determining the potential for effectiveness of any educational plan is the uncertainty that surrounds the boaters' behavior. Specifically, this involves the lack of precision in predicting whether boaters will make themselves available to presentation of the educational messages; whether they subsequently can recall the information in the educational messages when needed during a boating crisis; and whether the boaters will choose to act in the ways recommended in the educational messages if and when they recall the information. Consider further that training and education are processes taking place in the present for use at some future time. That is, education takes place now, but its application is solely in future situations that the trained or educated person may encounter.

Educational solutions may be an effective answer to dealing with boating accidents, but prediction of their success is tenuous at best. The USCG can "maximize" the potential for success of an educational program by utilizing the highest quality alternatives for conceiving, producing, and disseminating the various educational messages. These alternatives are discussed in the research report prepared for USCG, Educational Alternatives for Boating Safety Programs, January 1978. The utilization of these alternatives for collision accidents is presented in this report.

1.2 Scope of Educational Solutions for Collision Accidents

Educational solutions here are limited to a means for informing boat operators about ways to deal effectively with situations specified as major causes in collision accidents. Operator action or boating conditions that were unlikely to be changed by providing educational information about the situation (or consequences of the action) were not considered suitable for educational approaches. In cases where rules and regulations for boat operation exist and are pertinent to the operator behavior in question, enforcement strategies become involved as well as educational methods. Educational methods typically end and enforcement begins when boat operators are informed of: 1) their obligations to comply, 2) the likelihood of detection for non-compliance, and 3) the consequences for non-compliance. Enforcement strategies are comprised of monitoring for detection of non-compliance (surveillance), and the administering of appropriate punishments when non-compliance occurs. There is a point beyond which enforcement situations are not amenable to educational intervention.

1.3 Objectives of the Collision Education Project

This project is intended to accomplish the following objectives:

- to select the collision accident causes and factors associated with collision accidents that will most likely yield high benefits in an educational effort,
- to determine demographic characteristics of operators of boats involved in accidents resulting from the selected causes and associated factors,
- to develop educational objectives that address boat operators' decisions and behavior in situations involving the selected accident causes and associated factors,
- to specify message content, production messages, delivery systems, and considerations for the planning and execution of an educational program that will reduce the occurrence of collision accidents and fatalities.

1.4 Definitions for the Project

Three definitions are required for precise identification of the scope of the project. A collision accident refers to an accident where a boat: 1) strikes

a fixed object in the water such as a breakwater 2) strikes a floating object such as a log 3) collides with another boat or 4) runs aground.

Accident causes refer to operator behavior or to events responsible for the occurrence of the accident as determined by analysis of the accident reports. In the case of two-boat accidents, two causes are given for each accident (no boat operator receives singular "blame" for the accident). Associated factors refer to operator behavior, events, or conditions present during pre-crash times that are not considered direct causes, but are known to diminish operator skill and effectiveness. These factors may interact with other aspects of hazardous situations, resulting in accidents which might otherwise have been avoided. Their presence increases the likelihood of an accident occurring.

1.5 Organization of the Project

The objectives of this project are carried out in three steps. In Part I (Sections 2.0 through 5.0) the most frequently occurring collision accident causes and associated factors are determined, and demographic information for operators involved in the selected cause/associated factor types of accidents are compiled. Part II (Section 6.0) consists of the specification of educational objectives and message content on the basis of data from Part I. In Part III (Section 7.0) the production of actual messages and considerations for presenting the educational program are reported.

2.0 METHOD FOR IDENTIFICATION OF MAJOR COLLISION ACCIDENT CAUSES AND ASSOCIATED FACTORS

The data base used in the identification of major collision accident causes and associated factors was developed in an earlier project, Recreational Boat Safety Collision Research - Phase II (Reference 1). This section describes the source of that data, how it was coded and tabulated, the weighting procedure which was developed specifically for the present project, and the criteria by which the final selection of causes and factors for the educational effort was made. A work flow diagram for the identification of major collision causes and associated factors is presented in Figure 1.

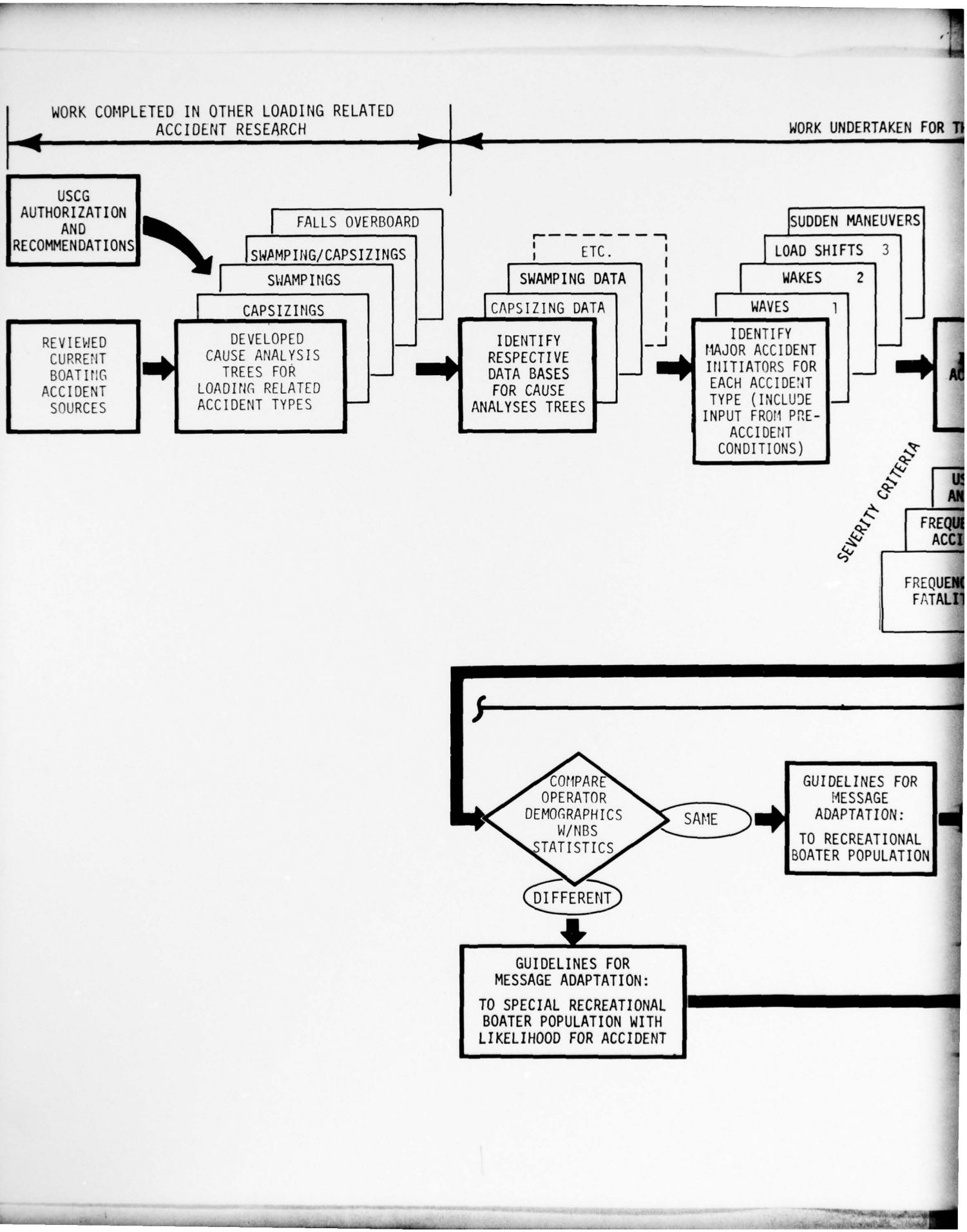
2.1 Source for Data Concerning Collisions - Causes and Associated Factors

The basic collision accident data consisted of a sample of 105 recreational boat collisions involving 166 boats compiled for the Collision Research project (Reference 1). The sources of these data included Boat Accident Reports (BARs) filed with the USCG for the years 1969 and 1973, 1969 and 1973 Coast Guard Marine Inspection Officer Reports (MIOs), reports of the 1974 and 1975 Wyle In-Depth Accident Investigations, and 1975 telephone interview reports with Coast Guard officers reporting accidents to Wyle. A relatively large proportion of MIO reports (written only for fatal accidents) was chosen since BARs would, in most instances, furnish insufficient information to yield human factors data. As a consequence of this decision, the data base was heavily biased toward fatalities, much more so than CG-357 statistics. There were 35 fatal accidents that resulted in 43 fatalities. The breakdown of accidents is presented in Table 1.

TABLE 1. SOURCES FOR THE DATA BASE

Source of Accident	Boats	Collisions	Two Boat Collisions	Collisions W/ Fixed Objects	Collisions W/ Floating Objects	Groundings
1969 BARs	25	16	9	5	2	0
1969 MIO	25	15	10	4	1	0
1973 BARs	25	15	10	4	1	0
1973 MIO	25	15	10	2	2	1
1974 In-Depth	12	6	6	0	0	0
1975 In-Depth	15	10	5	4	0	1
1975 Telephone Interviews	39	28	11	10	2	5
TOTALS	166	105	61	29	8	7

for associated factors involved for the fatal accidents


WORK COMPLETED IN OTHER LOADING RELATED ACCIDENT RESEARCH
WORK UNDERTAKEN FOR TH
USCG AUTHORIZATION AND RECOMMENDATIONS
REVIEWED CURRENT BOATING ACCIDENT SOURCES
FALLS OVERBOARD
SWAMPING/CAPSIZINGS
SWAMPINGS
CAPSIZINGS
DEVELOPED CAUSE ANALYSIS TREES FOR LOADING RELATED ACCIDENT TYPES
ETC.
SWAMPING DATA
CAPSIZING DATA
IDENTIFY RESPECTIVE DATA BASES FOR CAUSE ANALYSES TREES
SUDDEN MANEUVERS
LOAD SHIFTS 3
WAKES 2
WAVES 1
IDENTIFY MAJOR ACCIDENT INITIATORS FOR EACH ACCIDENT TYPE (INCLUDE INPUT FROM PRE-ACCIDENT CONDITIONS)
SEVERITY CRITERIA
US
AN
FREQUE
ACCI
FREQUENC
FATALIT
COMPARE OPERATOR DEMOGRAPHICS W/NBS STATISTICS
SAME
GUIDELINES FOR MESSAGE ADAPTATION:
TO RECREATIONAL BOATER POPULATION
DIFFERENT
GUIDELINES FOR MESSAGE ADAPTATION:
TO SPECIAL RECREATIONAL BOATER POPULATION WITH LIKELIHOOD FOR ACCIDENT

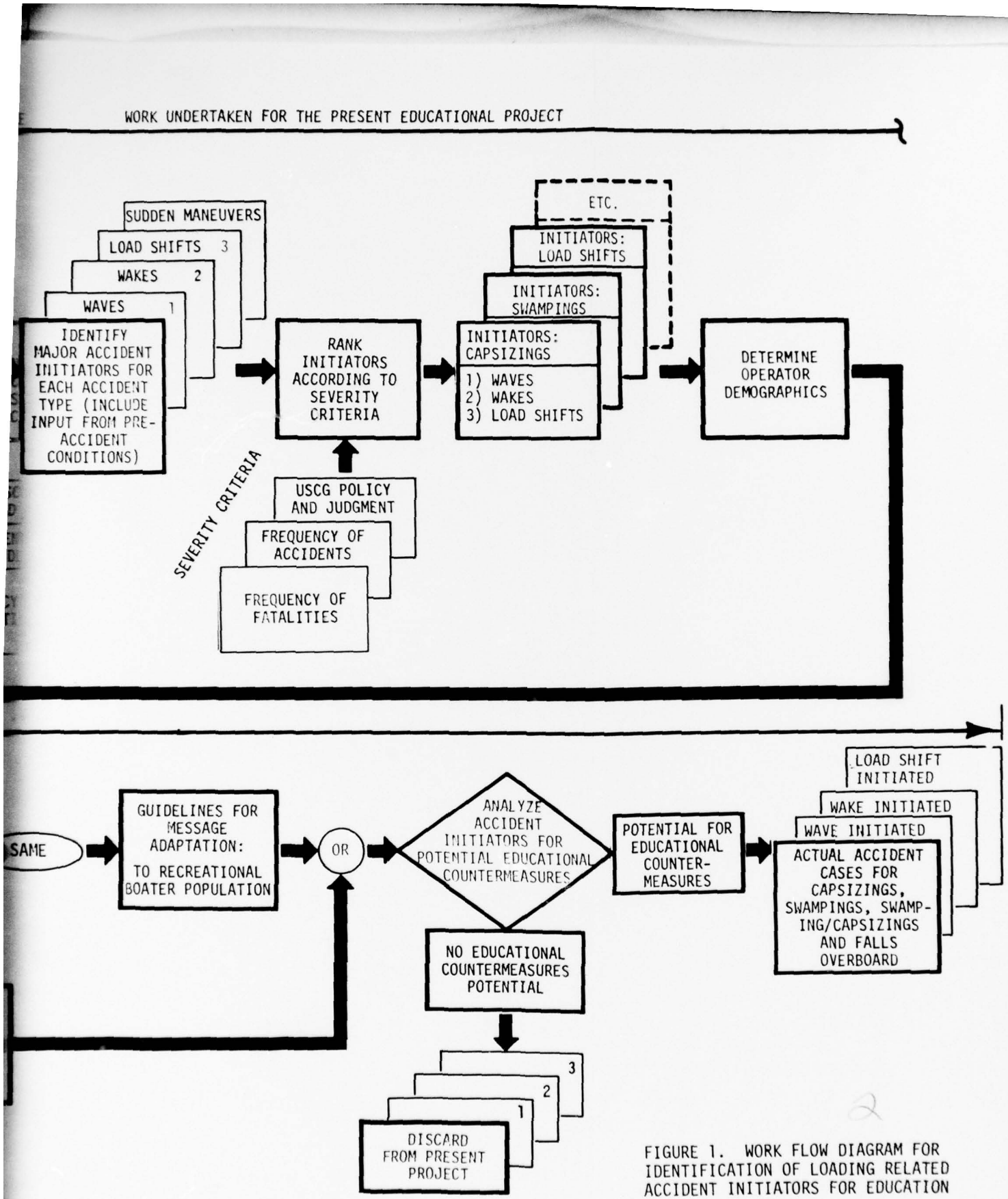


FIGURE 1. WORK FLOW DIAGRAM FOR IDENTIFICATION OF LOADING RELATED ACCIDENT INITIATORS FOR EDUCATION

2.2 Coding and Tabulation of Frequencies for Causes and Associated Factors for Collision Accidents

The data for analysis included frequencies of collision accidents, numbers of boats involved, and frequencies of fatalities. The arrays of causes and associated factors for the collision accidents were determined in the earlier Collision Research project (Reference 1). Three qualified persons were chosen to analyze and code each collision accident for that project. These persons identified the various causes by means of a cause identification tree designed for that purpose. The cause identification tree is presented in Appendix A. Thirty-four individual causes were identified in that analysis of the collision data. The definitions for each cause are presented in numerical order by their code numbers in Appendix B. The tabulation of the number of boats attributed to the various causes is presented in Appendix C.

The associated factors were conditions or behaviors frequently found to be present in accidents which reduce operator performance below maximum capacity. The coders tabulated the frequency with which each of these factors could be reliably established as present in the collision accidents. A copy of the form used by coders to report the presence of the associated factors is given in Appendix D. Ten factors were identified as being among those most likely to be associated with accident occurrences. The include the following:

- reckless or malicious operation,
- excessive speed for conditions,
- operator alcohol consumption,
- operator inattention,
- operator fatigue (four or more hours on outing),
- shock and vibration,
- high noise levels,
- nighttime glare,
- daytime glare,
- reduced forward visibility due to equipment, bow angle, or persons on board (forward of the operator).

For the present report, additional analysis of the data was undertaken to establish the relative number of accidents and fatalities attributable to each cause for educational purposes. This analysis was to identify major accident causes and

associated factors on the basis of high accident and fatality rates on a per accident basis. In turn, these findings were used to define the educational objectives and message content for the educational program.

2.3 Weighting Procedures for Determination of Major Causes and Associated Factors

The data taken from the Collision Research report (Reference 1) consisted of frequency tabulations of accidents, boats involved, and fatalities. It is apparent that any given multi-boat accident may involve a different cause for each of the operators involved, as well as the presence of a number of associated factors. For this reason an index more complex than simple frequency counts was necessary in order to arrive at a valid criterion for selecting causes and associated factors for the educational program. The index selected was a weighting procedure for fatalities and accidents.

2.3.1 Weighting for Fatalities

The weighting procedure was developed to take into account the number of boats involved in each collision and multiple occurrences of fatalities. In single boat collisions, all fatalities were attributed to the single collision cause. In two-boat collisions, the total number of fatalities was divided equally between the two causes (one-half of the fatalities being attributed to each cause). Thus, the procedure arbitrarily assigned half of the responsibility of a two-boat collision to each of the boat operators. The total number of fatalities assigned to each cause is then the sum of the weighted fatalities attributed to that cause in all collisions in which it was present. Mathematically, the fatality weight attributed to cause j is equal to:

$$\sum_{\substack{\text{all}\\ \text{sampled}\\ \text{collisions}}} \frac{\left(\begin{array}{c}\text{number of fatalities}\\ \text{in collision}\end{array}\right)\left(\begin{array}{c}\text{number of occurrences of}\\ \text{cause j in collision}\end{array}\right)}{\text{number of boats in collision}} \qquad (1)$$

The same weighting method was used in assigning fatality weights to associated factors. If a factor such as alcohol consumption was present in a one-boat

collision, all fatalities in that collision were attributed to it. If the factor was present on only one of the two boats in a two-boat collision, only half of the collision fatalities were attributed to it. Equation (1) again applies, substituting "associated factor j" for "cause j."

2.3.2 Weighting for Accidents

A second weighting procedure was developed for use in attributing responsibility for the occurrence of accidents to each cause and associated factor, irrespective of fatalities. The method used to weight the occurrence (frequency) of collision causes and associated factors was essentially the same as for the fatality criterion except that the number "1" was used in place of the number of fatalities in each collision to denote a single accident. Mathematically, the collision weight attributed to cause or associated factor j is equal to:

$$\sum_{\substack{\text{all}\\ \text{sampled}\\ \text{collisions}}} \frac{(1)\ (\text{number of occurrences of cause j in collision})}{\text{number of boats in collision}} \qquad (2)$$

2.3.3 Illustrative Example of the Application of Weighting Procedures

To illustrate the application of these weighting procedures to the collision accident data base, consider a hypothetical scenario. Suppose that boats A and B were involved in a collision resulting in three fatalities. Both boats were being operated at speeds in excess of that appropriate for traffic conditions; the operator of Boat A had been drinking. Boat operator B thought that the other boat would avoid the collision (Cause Code 202), and operator A was not looking and never saw the other boat (Cause Code 222). The following weights would be assigned to causes and associated factors:

Fatality weights attributed to each cause are:

$$\frac{(3\ \text{fatalities})\ (1\ \text{occurrence})}{2\ \text{boats}}$$

or 1.5. The same value of 1.5 results for the associated factor, operator alcohol consumption which also occurred once. The fatality weight for the associated factor, excessive speed, is

$$\frac{(3\ \text{fatalities})\ (2\ \text{occurrences})}{2\ \text{boats}}$$

or 3.0.

Accident weights are: $\frac{(1 \text{ fatality})\ (1 \text{ occurrence})}{2 \text{ boats}}$

or 0.5 for each cause and the alcohol factor, and

$$\frac{(1 \text{ fatality})\ (2 \text{ occurrences})}{2 \text{ boats}}$$

or 1.0 for the excessive speed factor.

2.4 Criteria for Selection of Major Causes and Associated Factors

The final selection of collision accident causes and associated factors to be addressed by the educational program was based upon three criteria:

- the weighted frequencies of collision accidents that were linked to each cause/factor; those causes/factors associated with higher numbers of accidents warranted consideration for educational solution,
- the weighted frequencies for fatalities that occurred as a result of the accidents linked to each cause/factor; those causes/factors associated with higher numbers of fatalities warranted consideration for educational solution, and
- the accessibility of each cause/factor to educational intervention; those causes/factors for which operators' decisions and behavior were in some way at fault warranted consideration for educational solution.

3.0 RESULTS OF IDENTIFICATION OF MAJOR ACCIDENT CAUSES AND FACTORS ASSOCIATED WITH THE ACCIDENTS AND FATALITIES

3.1 Data on Causes for Collision Accidents and Fatalities

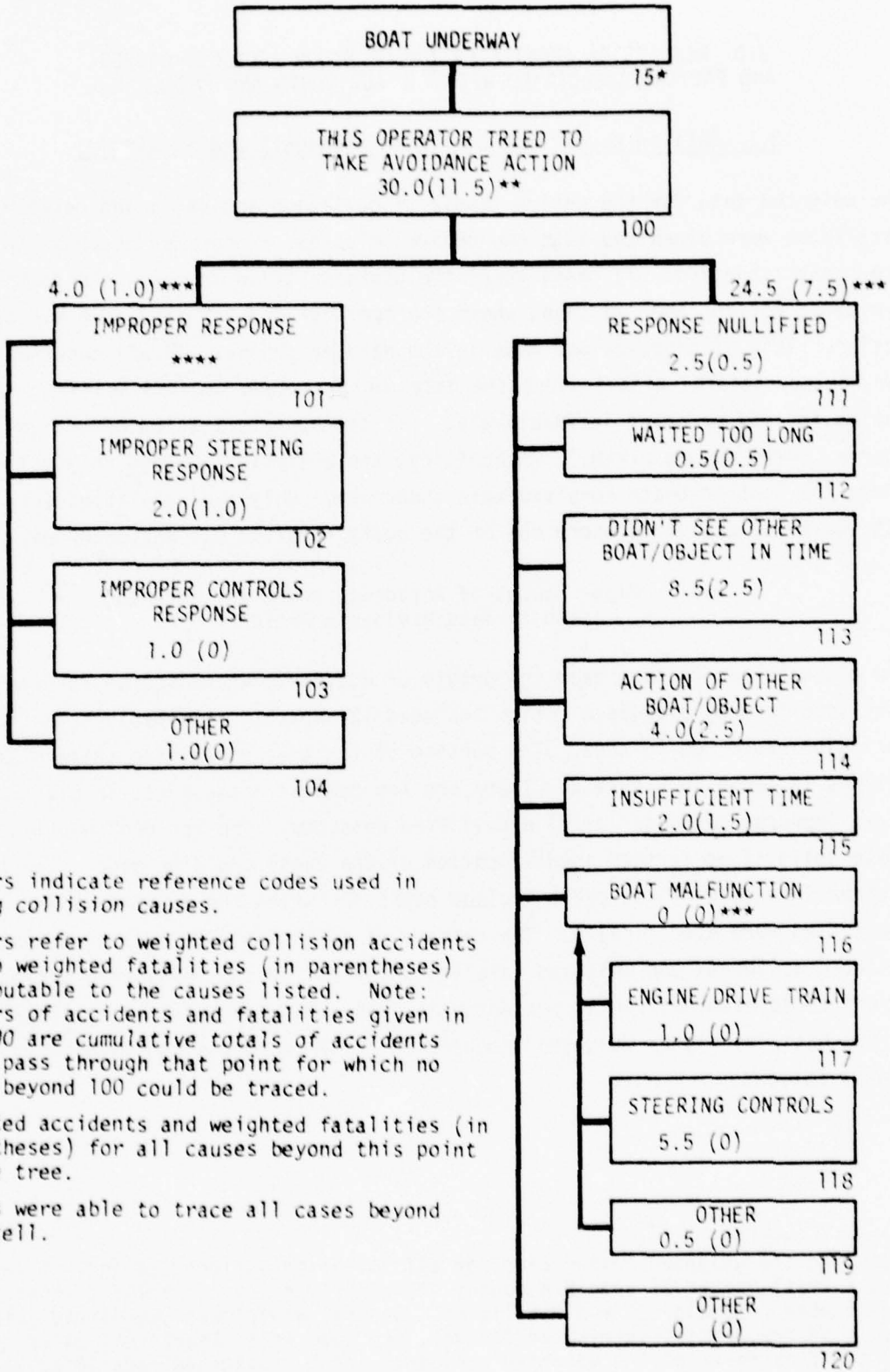
The weighted data for the entire sample of collision accidents and related fatalities were organized into two general classes of operator response to the pre-crash situation: 1) cases where the operator tried to take some form of avoidance action and 2) cases where the operator did not take some avoidance action. This distinction was made in the earlier project and was continued for the educational effort since the data would include crashes because operators failed to act, or acted ineffectively. (If the operators acted effectively, of course, there was no crash.) In addition, the analysis included only collisions where the boat or boats involved were under way. Only two fatalities were attributed to accidents where one of the boats involved was not under way.

3.1.1 Major Causes of Accidents Where the Operator Tried to Take Avoidance Action

The causes known to have been the origin of accidents where operators tried to take some form of avoidance action included 12 separate alternatives in the collision cause coding tree. The portion of the tree containing these classifications is shown in Figure 2. There are two general categories, involving either 1) an improper response or 2) a nullified response. The accident was listed in these cells if no further identification of the cause could be made. The twelve alternatives below these cells include cases for which the cause could be identified more specifically. The summary of collision data including the weighted accidents and weighted fatalities for all of the "avoidance action taken" cause alternatives is presented in Figure 2. The major causes (selected on the basis of higher weighted frequencies)* for accidents and fatalities are as follows:

---

*Scanning the weighted frequencies for all collision accident causes, it was seen that a small number of specific causes was clearly responsible for a relatively high number of accidents and fatalities. Several additional causes had intermediate levels of frequencies attributed to them, and some were clearly not major causes. A cut-off criteria of 4.0 weighted accidents and 2.0 weighted fatalities was chosen after observations of the outcomes for all cells in the tree.



* Numbers indicate reference codes used in coding collision causes.

** Numbers refer to weighted collision accidents and to weighted fatalities (in parentheses) attributable to the causes listed. Note: numbers of accidents and fatalities given in Box 100 are cumulative totals of accidents which pass through that point for which no cause beyond 100 could be traced.

*** Weighted accidents and weighted fatalities (in parentheses) for all causes beyond this point in the tree.

**** Coders were able to trace all cases beyond this cell.

FIGURE 2. SUMMARY OF COLLISION CAUSES WHEN OPERATOR TOOK AVOIDANCE ACTION

- the operator did not see the boat or object in time to avoid the collision (weighted accidents: 8.5; weighted fatalities: 2.5)*, and
- the operator could not avoid the accident because of the action of the other boat involved (weighted accidents: 4.0; weighted fatalities: 2.5)**.

The second cause is considered to be outside the scope of educational intervention since it is improbable that any instruction could provide the operators with an alternative behavior that could prevent the accident. The accidents included in the educable cause category were set aside for further analysis of operator actions.

3.1.2 Major Causes of Accidents Where Operators Did Not Take Avoidance Action

The general category of causes where operators did not take avoidance action includes more alternatives than the category involving "attempted avoidance action" (20 versus 12). Further, the larger group of alternatives included almost twice as many weighted collision accidents (56.0 vs. 30.0). The summary of collision data including the weighted accidents and weighted fatalities for all of the "no avoidance action taken" cause alternatives is presented in Figure 3. Causes were further classified according to whether the operator in question did or did not see the other boat/object. In most cases (41.0 or 73.2% of weighted accidents; 19.5 or 83.0% of weighted fatalities), the operator did not see the other boat or object before the collision occurred. Sixteen (39%) of these cases (involving 9.5, or 48.7% of weighted fatalities) had been coded as situations

---

*The detailed definition of this type of situation from Appendix B is as follows:

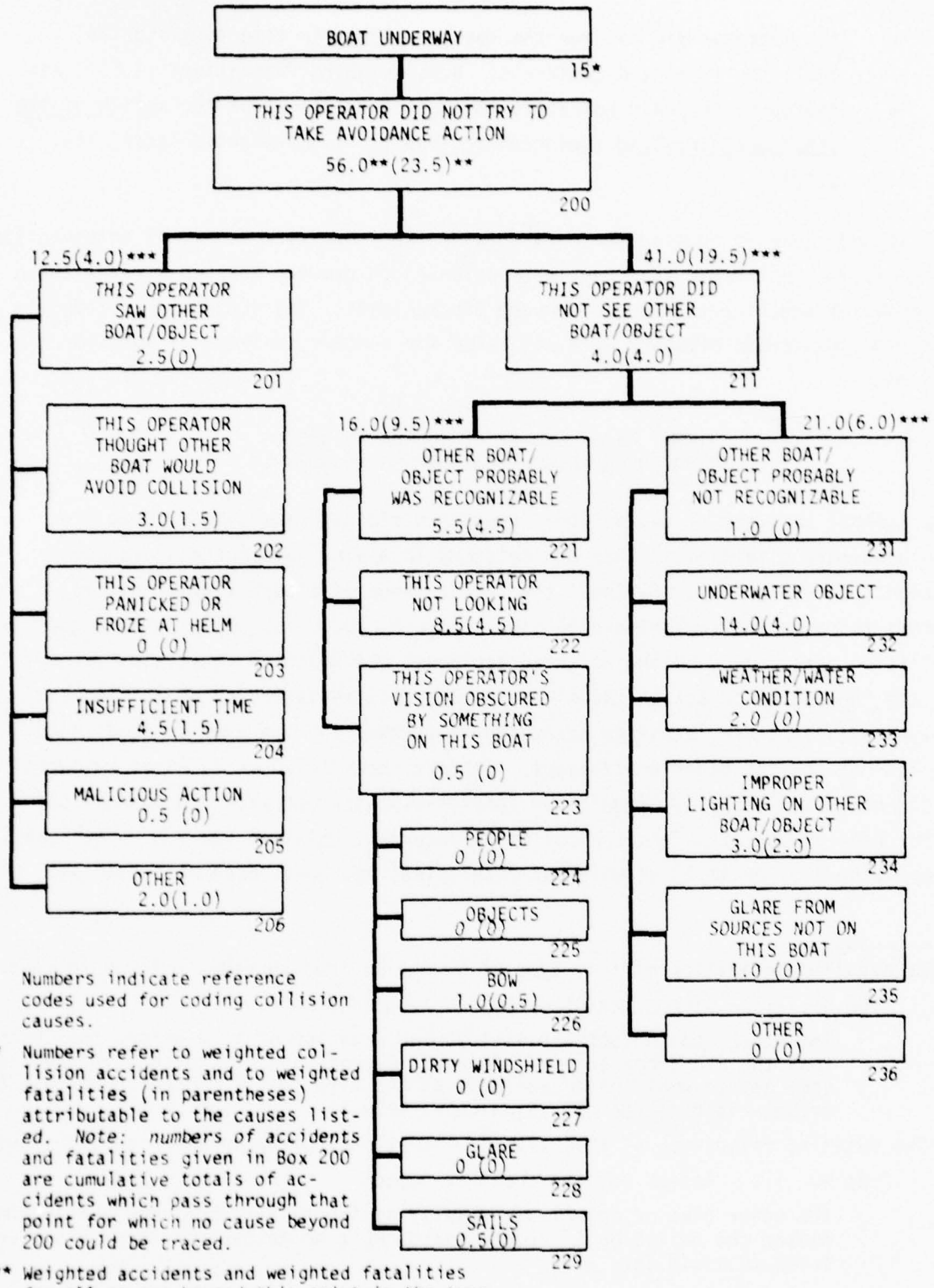
Code No. 113 - Didn't see other boat/object in time

The other boat/object was visible for a period of time before this operator took the avoidance action. There is a good possibility that if the avoidance action would have been made at the time that the other boat/object became visible, the collision could have been avoided.

**The detailed definition of this type of situation from Appendix B is as follows:

Code No. 114 - Action of other boat or object

The other boat or object was totally at fault. It made some action that caused the collision to become unavoidable no matter how hard this operator tried to avoid it.



* Numbers indicate reference codes used for coding collision causes.

** Numbers refer to weighted collision accidents and to weighted fatalities (in parentheses) attributable to the causes listed. *Note: numbers of accidents* and fatalities given in Box 200 are cumulative totals of accidents which pass through that point for which no cause beyond 200 could be traced.

*** Weighted accidents and weighted fatalities for all causes beyond this point in the tree.

FIGURE 3. SUMMARY OF CAUSES OF COLLISIONS WHEN OPERATOR DID NOT TAKE AVOIDANCE ACTION

where the other boat or object should have been recognizable, indicating that the operator was *not sufficiently attentive* to the general operation of his boat. Apparently, this was a commonly occurring situation and was responsible for a substantial number of accidents/fatalities. In addition, operator attentiveness had high potential for improvement given successful educational intervention.

Using the same criterion in including causes to which at least 4.0 weighted accidents and 2.0 weighted fatalities were attributed, causes with the highest weighted accidents/fatalities are:

- this operator not looking (weighted accidents: 8.5; weighted fatalities: 4.5)*, and
- collision with an underwater object (weighted accidents: 14.0; weighted fatalities: 4.0)**.

The first cause is the biggest single cause under the category of accidents where the other boat/object probably was recognizable, and thus could have been avoided if the boat operator had been paying attention. This group of accidents was also considered as a prime target for educational solution.

The second cause is again not one which is within the scope of educational solutions, since it involves situations where some submerged object is not recognizable to the operator. In other words, the operator could not have avoided the accident regardless of his attentiveness.

3.2 Associated Factors for Collision Accidents and Fatalities

The factors associated with the occurrence of the collision accidents refer to behaviors, conditions, or events that were present during the accident situation, but which could not be directly established as the origin of the accident.

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*The detailed definition of this type of situation from Appendix B is as follows:

Code No. 222 - This operator not looking

This operator did not see the other boat/object because he wasn't looking in that direction just prior to the collision.

**The detailed definition of this type of situation from Appendix B is as follows:

Code No. 232 - Underwater object

This boat hit an underwater object that was not recognizable.

As would be expected, many accidents had several of these factors associated with them. The list of associated factors used for the educational analysis and the weighted frequencies of their occurrence are presented in Table 2.

The weighted frequencies for the associated factors were ranked for both accident numbers and for fatalities. In general, the rankings of the factors for weighted accidents tended to coincide with those for weighted fatalities. However, the factors of "high noise" and "shock and vibration" departed from the ranking, and were more often linked to all accidents than to the fatal accidents alone. A statistical comparison was made to determine the extent to which the two rankings coincided using Pearson r ($r = 0.973$; $t = 11.24$; $t(7) = 1.895$, $p < 0.05$). It can be concluded that the two rankings for the associated factors are highly related and that the relationship is statistically significant.

TABLE 2. ASSOCIATED FACTORS AND WEIGHTED FREQUENCIES OF COLLISIONS AND FATALITIES IN WHICH THEY WERE INVOLVED

ASSOCIATED FACTORS*	ALL COLLISIONS (WEIGHTED BY OCCURRENCES)	FATAL COLLISIONS (WEIGHTED BY FATALITIES)
Reckless or Malicious Operation	38.5	18.5
Excessive Speed for Conditions	26.0	10.0
Operator Alcohol Consumption	10.0	6.0
Operator Inattention	13.5	4.5
Operator Fatigue (four or more hours on outing)	10.0	4.0
Shock and Vibration	11.0	3.5
High Noise Levels	11.0	3.0
Nighttime Glare	8.5	3.0
Daytime Glare	8.0	3.0

*One associated factor was not included in analyses beyond the computation and assignment of weights, "reduced forward visibility due to equipment, bow angle, or persons on board (forward of the operator." Due to the low weighted values attributed to it for all accidents and for fatalities, 1.5 and 0.5, respectively, this factor did not seem to warrant further analysis.

Because of the high correlation between rankings for accidents and fatalities, and because fatal accidents are the most serious and reflect the greatest losses, further analysis of the associated factors was limited to fatal accidents only.

Two additional comparisons were made. First, the associated factors were arranged to indicate the relative number of multiple-fatality accidents that were linked to them. A list of the most commonly occurring of these associated factors and the frequency with which they were present in single- and multiple-fatality accidents is presented in Table 3.

TABLE 3. MAJOR ASSOCIATED FACTORS
ACCORDING TO THE RESULTING NUMBER OF FATALITIES

ASSOCIATED FACTORS	FATALITY NUMBER*		
	1	2	3
Reckless or Malicious Operation	18	5	2
Excessive Speed For Conditions	8	4	-
Operator Inattention	9	-	-
Operator Alcohol Consumption	5	2	-
Operator Fatigue	3	1	-

*In two boat collisions, a factor present for both operators is counted twice.

It should be noted that the reckless or malicious operation factor was involved in the three categories of single- and multiple-fatality accidents. This factor was also linked to single-fatality accidents twice as often as the next most frequently occurring factor. This factor was most frequently attributed to the two-fatality accidents, and was the only factor involved in a three-fatality accident. Excessive speed was linked often to the single-fatality accidents, and was involved for four operators in two-fatality accidents. Operators' inattention was given as the second most often occurring factor for the single-fatality accidents but was not involved in any multiple-fatality accidents. Alcohol consumption and operator fatigue were present for the single-fatality accidents and both were mentioned for operators in two-fatality accidents.

The second comparison was for associated factors involved for the fatal accidents in combination with the actual causes given for the accidents. This was intended primarily to determine if there were notable recurrent combinations of certain factors and the major causes. The summary of this comparison for the major associated factors is presented in Table 4. Number of boats involved and number of fatalities in each collision are included in this comparison. It may be noted that reckless or malicious operation was linked to all 13 accidents involving more than one associated factor and excessive speed was linked to nine of these multiple factor accidents. There does not seem to be a consistent observable set of combinations of factors and individual causes for the accidents. However, the reckless factor is often involved with the causes relating to operators' visual attention. When attention is focused specifically on the two highest frequency causes (Codes 113 and 222), for example, one finds that of the 14 fatalities attributed to those causes, nine, or 64.3%, involved malicious or reckless operation. It should be noted that this observation may be dependent upon the overall frequency with which the causes and factors occur in the distribution.

TABLE 4. MAJOR COLLISION CAUSES AND MAJOR ASSOCIATED FACTORS FOR FATAL ACCIDENTS* **

NUMBER OF FATALITIES	COLLISION CAUSE CODE	ASSOCIATED FACTORS***
3	113	R
	(202)	R
2	221	S
2	(211)	RFDS
2	222	R
	(115)	R
2	(100)	R
2	(100)	S
	(100)	RDS
1	(211)	R
	(234)	R
1	222	RI
	222	RI
1	222	I
	226	RSI
1	(204)	RS
1	221	RS
	(211)	R
1	221	RS
1	221	D
	(111)	I
1	221	RFDS
1	113	S
	(112)	R
1	221	-
1	(102)	R
1	222	-
	222	I
1	(211)	RS
1	(15)	F
1	(232)	D
1	(232)	R
1	(462)	I
	222	RI
1	222	RFDI
	(234)	RDS
1	(232)	R
1	113	-

*All shaded portions are for data from two-boat collisions.
**Cases involving neither a major cause nor a major associated factor are not listed. Causes which are not major, but are included because of the associated factors involved, are enclosed in parentheses.
***D - Operator Alcohol Consumption; F - Operator Fatigue; S - Excessive Speed for Conditions; I - Operator Inattention; R - Reckless or Malicious Operation.

4.0 GENERAL RECOMMENDATIONS FOR EDUCATION AND INSTRUCTION

The selection of collision accident causes to which this educational program can be directed was based on a series of criteria applied to the data base. First, those accident causes with the highest number of accidents and fatalities were identified. Then, causes in that group not accessible to educational intervention were discarded. The remaining cause categories were those involving boat operators who did not see the other boat or object early enough, or never saw it at all despite the fact that it was probably visible. The analysis of associated factors indicated that reckless or malicious operation is the associated factor involved in the largest number of collision accidents and fatalities. Other factors occurring notably in the accidents were excessive speed, alcohol consumption, and operator fatigue. The repeated presence of one or more of the most common human factors in virtually every fatal collision accident suggests that the educational program should include an objective aimed at increasing boaters' awareness of the importance of such associated factors. The next section includes a demographic analysis of boaters involved in the chosen accident categories.

It is apparent from the foregoing discussion that more precise information would be required to generate relevant educational objectives for these classes of accidents. This section does identify the major categories of accident causes and factors associated with the accidents. Additional analysis of individual accident cases themselves was undertaken to specify the exact operator knowledge and skills required for educational objectives (see Part II of this report).

5.0 ANALYSIS OF RECREATIONAL BOATER CHARACTERISTICS FOR OPERATORS INVOLVED IN FATAL COLLISION ACCIDENTS RESULTING FROM MAJOR CAUSES AND ASSOCIATED FACTORS

Demographic information was collected for the boat operators who were involved in those accidents in the major cause group. These were the fatal collision accidents which involved either a major accident cause or a major associated factor, including causes involving the operator's visual inattentiveness in a situation where the other boat/object should have been visible (Cause Codes 113, and 221 through 229) and the associated factors: reckless or malicious operation, excessive speed for conditions, operator alcohol consumption, operator inattention, and operator fatigue. The characteristics were selected as being relevant to subsequent decisions for the educational program concerning choices of mass media and educational methods. The boat operator characteristics selected for identification and analysis were: sex, age, occupation, formal education, formal boating courses, boat operating experience, and marital/parental status. The analysis of the boater profiles was conducted in two stages: identification of demographic characteristics for boaters in the selected collision cause groups, and the determination of whether certain characteristics departed from those of the boat operator population in general.

The identification of the operator demographic characteristics involved the tabulation of all available information for each characteristic as it was given on the copies of BARs provided by the U. S. Coast Guard Research and Development Center for the Safe Loading-Operator Study. New tabulations and additional statistical testing were required for the presentation of demographic information in a summary format. In order to determine the possible differences between the accident operator group and the population of recreational boaters, comparisons were made on characteristic by characteristic bases. The Nationwide Boating Survey (NBS) was consulted for statistics concerning the population of recreational boaters (Reference 2). The comparison between the two groups was based on the rationale that if systematic differences did emerge, it might be argued that persons of the specified demographic group have differential risks for accidents. Comparisons were made only when there was sufficient data for analysis.

5.1 Tabulation of Collision Accident Operator Demographic Characteristics

A summary profile of the boat operators involved in the fatal collision accidents resulting from major causes, or involving major associated factors, is presented in Table 5.

TABLE 5. SUMMARY OF BOAT OPERATOR DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTICS	PROFILE
Operator Sex	Males (36), Females (2)
Operator Age	Mean (30.4 yrs), Standard Deviation (13.9 yrs), Range (14-68 yrs)
Operator Occupation	Occupations given were: parts manager, student, engineer, fisherman, unemployed, laborer, skilled worker, lower income job, and middle income job. Data is incomplete.
Operators' Boating Education (Courses)	No boating course (13) boaters, Power Squadron Course (1), Coast Guard Auxiliary Course (1), and other (1). Data is incomplete.
Operators' Boating Experience	Under 20 hrs (2) 20 to 100 hrs (5) 100 to 500 hrs (11) Greater than 500 hrs (11) Data Incomplete
Marital/Parental Status	Single (8), Assumed Single (3), Married (14), Married and Parent (6), Married and Non-Parent (1).
Geographical Location of Home Area of Boat Operator	Demopolis, AL (2) Columbia, AL Foley, AL Mobile, AL Shelby, AL Nanapitchuk, AK (2) Claremont, CA Costa Mesa, CA Hayward, CA San Jose, CA San Leandro, CA Newton, IA Salisbury, MD (2) Chatham, MA Holland, MI Ludington, MI Mt. Clemons, MI Rockford, MI Riverside, NJ (Probably Upstate NY) Charlotte, NC Oregon, OH Cave Junction, OR (Wife: San Francisco, CA) Pittsburg, PA Clover, SC Rutledge, TN Henderson, TX Houston, TX (2) (Near) Norfolk, VA (2) Virginia Beach, VA Burton, WA Seattle, WA Milwaukee, WI

5.2 Comparison of Loading-Related Accident Operators and NBS Recreational Boaters

Analyses to determine possible differences between the accident boat operators (those operators associated with the major causes and human factors) and the NBS recreational boaters were conducted for operator sex, age, age for male operators only, boating experience, and formal boating education. These characteristics were selected on the basis of the availability of sufficient data for analysis from the BARs. Formal education of operators could not be compared to any national norms since this information was not available from the accident data.

5.2.1 Sex of Operators

There was some departure from NBS for the proportionate number of female operators reported in the collision accident profile. NBS indicates that the overall boating operator population contains 75.1% males; 94.7% of the collision accidents involved male operators. The frequencies and percentages for these comparisons are presented in Table 6.

TABLE 6. COLLISION OPERATOR AND NBS OPERATOR SEX

	NBS OPERATOR POPULATION	COLLISION OPERATOR SAMPLE
Males	12,287,731 (75.1%)	36 (94.7%)
Females	4,082,771 (24.9%)	2 (5.3%)

($\chi^2 = 7.86$; $\chi^2(1) = 3.84$, $p < 0.05$)

Computation of the chi-square statistic using the "goodness of fit" procedure indicated that the difference between males and females was significant at the 0.05 level of probability ($\chi^2 = 7.86$; χ^2 (1) = 3.84). It may be concluded that the proportion of male operators involved in fatal collisions is greater than the proportion of male operators in the general boating population.

5.2.2 Age of Operators

The mean operator age reported in the collision accident group was slightly lower than that of operators listed in NBS. The NBS mean age and standard deviation

were 34.2 yrs and 15.5 yrs*, respectively, as compared to 30.4 yrs and 13.9 yrs in the collision operator profile. The distributions of ages for both groups are presented in Table 7. The class intervals selected for the data were those given in NBS. A chi-square "goodness of fit" test was used to determine whether the age distribution of the collision operator profile was statistically different from the age distribution of NBS operators. Because the class intervals in Table 7 were too small to obtain minimum required theoretical frequencies for the test, the intervals were combined from nine intervals to five. The combined data are presented in Table 8. The chi-square test yielded a value of $\chi^2 = 5.04$, which is not statistically significant at the 0.05 level (χ^2 (4) = 9.49). The null hypothesis that the mean age of the collision operator population was the same as that of the NBS boat operators was tested using the t statistic. The result was also not statistically significant at the 0.05 level of confidence ($t = 1.64$, $t(35) = 2.03$). Consequently, there was no reason to conclude that there is a significant difference between either the age distributions or the mean ages of the operators involved in fatal collisions and all recreational boat operators.

TABLE 7. OPERATOR AGE DISTRIBUTIONS
(COLLISION AND NBS PROFILES)

AGE (YEARS)	COLLISION OPERATOR PROFILE		NATIONWIDE BOATING SURVEY (NBS)	
	Number of Operators	Percentage	Number of Operators	Percentage
Under 12	0	0	577,127	3.5
12-15	3	8.3	928,899	5.7
16-19	6	16.7	2,020,183	12.3
20-25	5	13.9	2,363,356	14.4
26-30	9	25.0	2,035,444	12.4
31-40	6	16.7	2,932,781	17.9
41-50	2	5.6	2,726,306	16.7
51-60	4	11.1	1,648,709	10.1
Over 60	1	2.8	1,137,697	6.9
TOTAL	36*	100.0	16,370,502	100.0

* Age was unknown for two operators.

TABLE 8. COMBINED INTERVALS FOR OPERATOR AGE DISTRIBUTIONS (COLLISION AND NBS PROFILES)

Age (Years)	COLLISION OPERATOR PROFILE Number of Operators	NATIONWIDE BOATING SURVEY (NBS) Number of Operators
0-19	9	3,526,209
20-30	14	4,398,800
31-40	6	2,932,781
41-50	2	2,726,306
Over 50	5	2,786,406
TOTAL	36	16,370,502

($\chi^2 = 5.04$; $\chi^2\ (4) = 9.49$, $p > 0.05$)

5.2.3 Male Operator Age for Collision and NBS Operators

Since the preceding analyses indicate that male operators may have a higher risk for collision accidents, a further comparison was made to determine whether there was an age difference between males in the collision group and NBS. The two male age distributions are presented in Table 9. Again, the class intervals were too small to obtain the minimum required theoretical frequencies for a chi-square "goodness of fit" test; so they were combined as in the previous comparison. The combined data are presented in Table 10. The computed chi-square value of $\chi^2 = 7.01$ was not statistically significant at the 0.05 confidence level ($\chi^2\ (4) = 9.49$). This indicates that the two age distributions are not different. An additional comparison was made between the mean ages for the two groups. The t statistic was used to determine if the mean age of the male collision operators, 30.0 years, standard deviation of 14.0 years, was statistically different from the mean age of the male NBS operators, 35.3 years, with a standard deviation of 15.8 years*. The computed t value was statistically significant at the 0.05 confidence level ($t = 2.21$; $t(33) = 2.03$, $p < 0.05$). The difference between the two means was 5.3 years. Thus, it appears that on the average, the male collision operators are somewhat younger than the general population of male boat operators.

*The NBS mean and standard deviation were obtained as described in the footnote

TABLE 9. MALE OPERATOR AGE DISTRIBUTION

Age (Years)	COLLISION OPERATORS		NATIONWIDE BOATING SURVEY (NBS)	
	Number of Male Operators	Percentage	Number of Male Operators	Percentage
Under 12	0	0	436,124	3.6
12-15	3	8.8	609.705	5.0
16-19	6	17.7	1,311,872	10.7
20-25	4	11.8	1,730,060	14.1
26-30	9	26.5	1,554,923	12.7
31-40	6	17.7	2,170,372	17.7
41-50	1	2.9	2,116,470	17.2
51-60	4	11.7	1,372,263	11.2
Over 60	1	2.9	985,942	8.0
TOTAL	34	100.0	12,287,731	100.0

TABLE 10. MALE OPERATOR AGE DISTRIBUTION (COMBINED INTERVALS)

Age (Years)	COLLISION OPERATORS Number of Male Operators	NATIONWIDE BOATING SURVEY (NBS) Number of Male Operators
0-19	9	2,357,701
20-30	13	3,284,983
31-40	6	2,170,372
41-50	1	2,116,470
Over 50	5	2,358,205
TOTAL	34	12,287,731

($\chi^2 = 7.01$, $\chi^2\ (4) = 9.49$, $p > 0.05$)

5.2.4 Operator Boating Experience

A comparison of the number of hours of boating experience for primary boat operators in the collision group and those listed in NBS produced no readily observable differences. At this point, it should be noted that NBS operator experience pertains to the primary boat operator of the "family" surveyed rather than

experience given for all boat operators in the household.* The effect of this shift in emphasis in the NBS data will very likely inflate the experience given for all recreational boaters, at least when these hours of experience are compared to the accident boat operator experience. The primary operators of boats will accumulate more experience in boating than others in the household, while the collision accidents in question occurred to operators regardless of whether they were the primary operators of the household or less frequent operators in the household. A systematic bias in the results might favor an overestimation of the experience in the NBS group or an underestimation of the experience of the accident operator group. However, it remains that primary operators, being exposed to boating for a longer period of time, also have increased their chances for the occurrence of an accident simply as a function of exposure time. In analyzing the data, a conventional assumption will be made: that such biases are counteractive (i.e., they cancel each other out) and will contribute only to variabilty of the distributions. Operators reported as having 2 to 4 years of experience were included in the 100-500 hrs category; operators reported as having five years of experience were included in the greater than 500 hrs category. The distribution of relative experience in hours of boating for operators in both groups is shown in Table 11. In the collision profile, the same number of boaters had over 500 hrs as had 100 to 500 hrs of experience; more boaters in NBS had experience in excess of 500 hrs than in other experience categories. However, computation of the chi-square "goodness of fit" test indicated that any differences in the distribution are not statistically significant at the 0.05 level of probability ($\chi^2 = 1.98$; $\chi^2\ (3) = 7.82$). Again, there is no statistical reason to expect that there is any difference between NBS boat operators and operators involved in fatal collisions with respect to experience. It is noteworthy that 76% of the collision profile operators had over 100 hrs experience, and about 38% had over 500 hrs. experience. Apparently, with the present data, the causes and factors associated with these collisions cannot be linked to operator inexperience.

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*The primary operator in a boating household was defined as "that operator with the most operating time in 1973" in the instructions provided to respondents in the NBS survey.

TABLE 11. OPERATOR EXPERIENCE DISTRIBUTION (COLLISION AND NBS PROFILES)

Experience (hours)	COLLISION OPERATOR PROFILE		NATIONWIDE BOATING SURVEY (NBS)	
	Number of Operators	Percentage	Number of Operators	Percentage
< 20	2	6.9	872,042	9.4
20-100	5	17.2	2,263,599	24.4
100-500	11	37.9	2,541,911	27.4
>500	11	37.9	3,599,494	38.8
TOTAL	29	100.0	9,277,046	100.0

($\chi^2 = 1.98$; $\chi^2(3) = 7.82$, $p > 0.05$)

6.0 PART II - SPECIFICATION OF EDUCATIONAL OBJECTIVES AND MESSAGE CONTENT

6.1 Introduction

The planning of an educational program should conform to known principles of learning. One of the central principles for guiding the development of an educational program is the specification of the exact nature of the behavior desired on the part of the person(s) to be educated. The resulting educational intentions are referred to as objectives. They provide guidance for subsequent decisions to be made about 1) the selection of educational methods 2) the means for implementing the methods and 3) the content of the educational messages themselves. The work flow diagram for the specification of educational objectives, and subsequent message content, media, production methods and delivery systems is given in Figure 4.

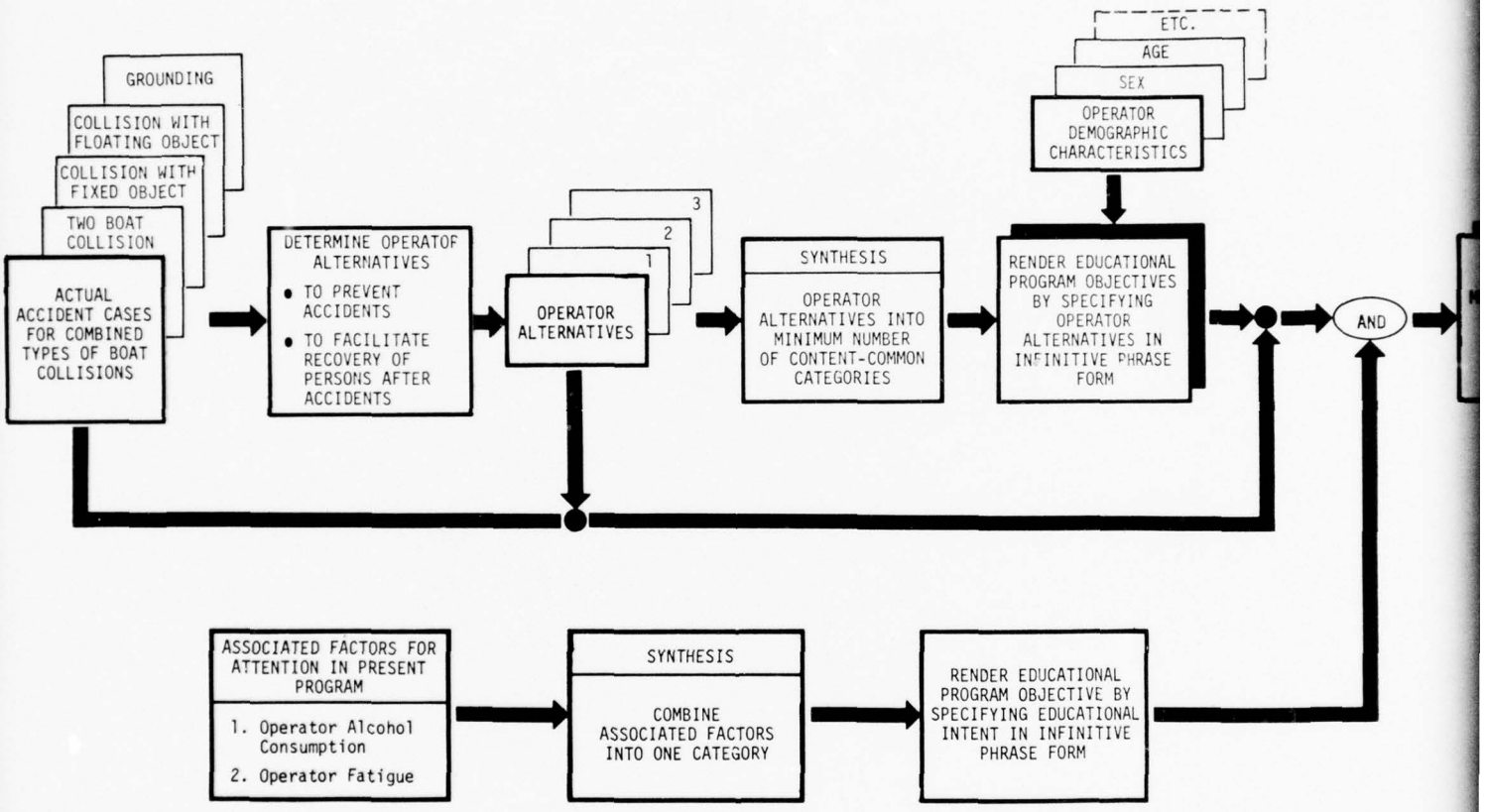
Objectives for an educational program such as those proposed for this project must be of two different types. The first type consists of the "general educational objectives" which deal with the needs and urgencies of a given problem area. They focus on the ultimate goals for the educational program, such as the reduction of collision boating accidents for the coming season. These objectives provide guidance for determining the parameters of the problem area, and structure a framework for formulating specific objectives used for actual instructional purposes. Discussion of general objectives for projects of this nature are typically presented in the introductory sections of reports where the purposes of the project are justified.

Operational or specific objectives are the second types of objectives. These are used to develop operational programs that implement the general goals of the project. There is much agreement in the educational literature that the statement of objectives for an operational program should be as specific as possible in the kinds of information that it includes.

Convention suggests that the statement of operational educational objectives for a program be based upon the following kinds of information*:

- identification of the persons who are to be educated.
- specification of behaviors that will be used for instruction or learning purposes.

*Discussion of objectives for education is available in Kibler, R.J., D.J. Cegala, D.T. Miles, and L.L. Barker, Objectives for Instruction and Evaluation, Boston: Allyn and Bacon, Inc., 1974. (Reference 3)


GROUNDING
COLLISION WITH FLOATING OBJECT
COLLISION WITH FIXED OBJECT
TWO BOAT COLLISION
ACTUAL ACCIDENT CASES FOR COMBINED TYPES OF BOAT COLLISIONS
DETERMINE OPERATOF ALTERNATIVES
• TO PREVENT ACCIDENTS
• TO FACILITATE RECOVERY OF PERSONS AFTER ACCIDENTS
3
2
1
OPERATOR ALTERNATIVES
SYNTHESIS
OPERATOR ALTERNATIVES INTO MINIMUM NUMBER OF CONTENT-COMMON CATEGORIES
ETC.
AGE
SEX
OPERATOR DEMOGRAPHIC CHARACTERISTICS
RENDER EDUCATIONAL PROGRAM OBJECTIVES BY SPECIFYING OPERATOR ALTERNATIVES IN INFINITIVE PHRASE FORM
AND
ASSOCIATED FACTORS FOR ATTENTION IN PRESENT PROGRAM
1. Operator Alcohol Consumption
2. Operator Fatigue
SYNTHESIS
COMBINE ASSOCIATED FACTORS INTO ONE CATEGORY
RENDER EDUCATIONAL PROGRAM OBJECTIVE BY SPECIFYING EDUCATIONAL INTENT IN INFINITIVE PHRASE FORM

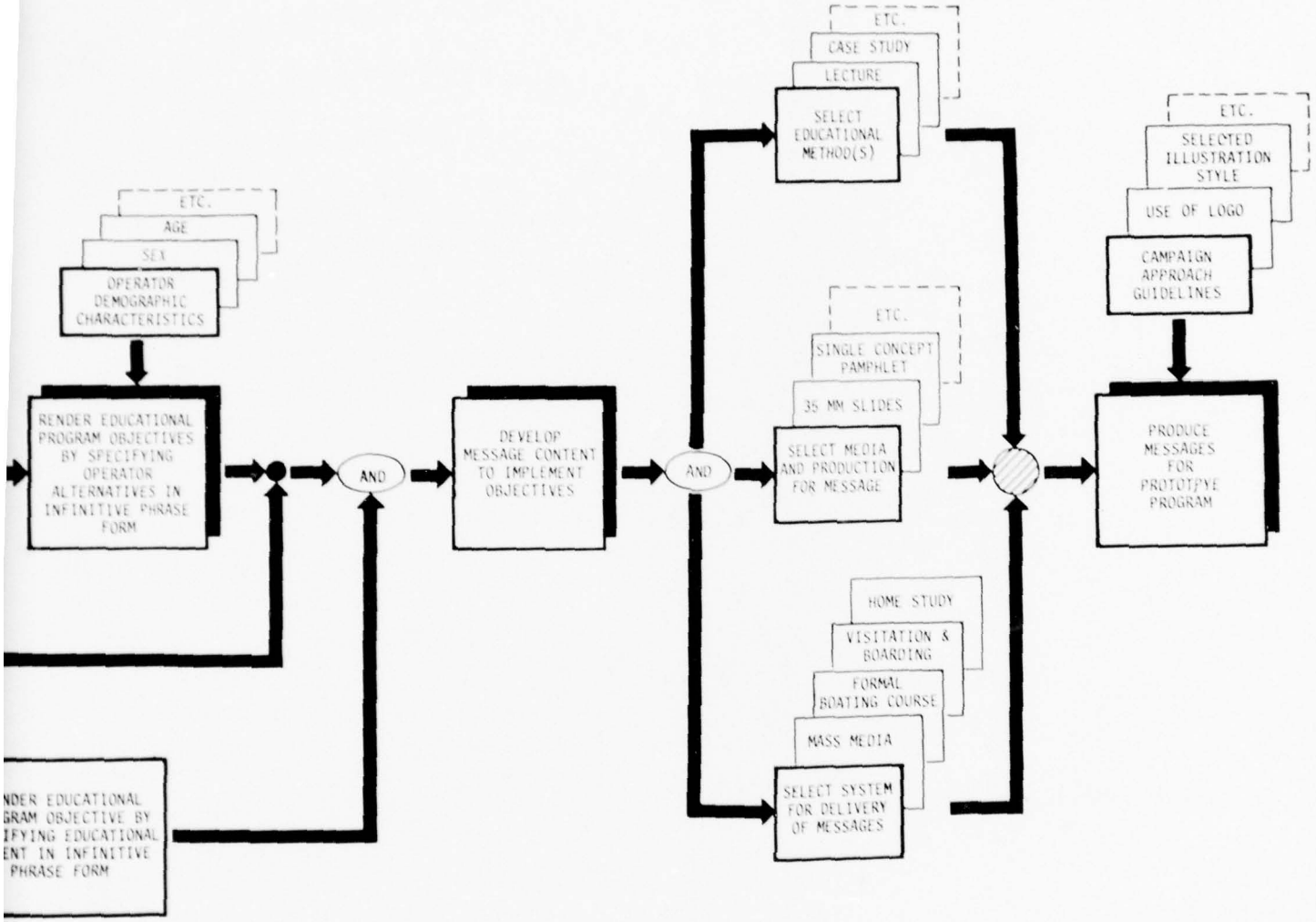


FIGURE 4. WORK FLOW DIAGRAM FOR DESIGNATING COLLISION OBJECTIVES, MESSAGES, MEDIA, AND DELIVERY SYSTEMS

- specification of performance that will be expected of the persons after the operational program is discontinued, or when it must be applied in real life situations.
- identification of conditions within which the education will take place.

6.2 Method for Designating Educational Objectives

The preparation of educational objectives for the collision accidents required two steps. First, all reports of collision accidents which involved the chosen major accident causes were reviewed once again. The review was conducted by three persons, two of whom had extensive experience in conducting in-depth boat accident investigations, and one person who was readily qualified to assess operator behavior in accident situations. Each person working at this task received a booklet consisting of instructions for the task and a group of the reports of the boat accidents organized by accident type, e.g., "collision accidents caused by this operator not looking." The persons were to read the report of each accident and to identify plausible operator decisions and/or actions that would have prevented the accident or reduced its severity within the conditions of the accident's occurrence. Then, using a work sheet accompanying the booklet, the persons wrote down the identification number for each accident and the corresponding alternative decisions or actions the operator could have employed. The instructions and a sample work sheet are presented in Appendix E.

There are two advantages for preparing objectives in this way as opposed to formulating the objectives from the accident causes without direct reference to the original scenarios. First, the accident causes themselves are abstractions from the actual accident events. That is, the causes are an interpretation of a group of accidents having a common set of causal characteristics. It is this attribute that permits the use of a cause identification tree for analyses of the accidents. However, it is apparent that each accident has its own set of unique characteristics not necessarily noted in the cause identification tree interpretation, such as particular circumstances or weather conditions. Compiling alternative operator behaviors from the original accident reports potentially allows each of these unique characteristics to influence the formulation of the objectives.

for Conditions; I - Operator Inattention; R - Reckless or Malicious Operation.

The second advantage to the procedure used is that it provided valuable assistance in constructing the messages for implementing the objectives. The method produced an array of operator alternatives and circumstances taken from the accidents themselves rather than from "typical" scenarios based upon abstract cause identification trees. The result was a more direct message content that precisely addressed corresponding educational objectives.

The second step in the preparation of the educational objectives was reduction of the most frequently occurring actions and decision alternatives given for the accidents into a smaller number of more general statements. In effect, the method used was inductive in that the more specifically given operator alternatives were generalized into a few more comprehensive statements. Three persons with experience in content analysis procedures participated in these judgments [E. Sager (principal investigator), J. Berman, and J. Murray (consultants)].

The reduced statements from each group of operators were then rephrased to a form consistent with behavioral objective format, i.e., an "infinitive phrase." The phrasing for each objective specified identification of the persons being educated and the desired outcome of the educational effort. For example, the first objective for the collision educational progarm was "to inform or remind boaters of their obligations with respect to rules of the road and to recognize and effectively display navigation lights."

6.3 Educational Objectives and Message Content for a Prototype Collision Accident Educational Program

Three collision educational objectives were produced by employing the content reduction procedure. An additional objective addressed the issue of the associated human factors. Corresponding statements of message content were primarily developed using information from the actual accident scenarios, and from the array of operator alternatives used for the objectives.

The objectives and message content generated for the program are presented in Table 12. Note that the message content given in this table refers to the information necessary to implement the objectives and not to actual messages for dissemination (the message content is delivered to the audience of recreational boaters by means of one or more productions).

TABLE 12. OPERATIONAL OBJECTIVES AND MESSAGE CONTENT FOR COLLISION EDUCATIONAL PROGRAM

OBJECTIVES - COLLISION AVOIDANCE	MESSAGE CONTENT
• To inform or remind boaters of their obligations with respect to rules of the road, and with effective display of navigation lights and accurate recognition of others • To remind and instruct boaters on how to read accurately various navigation aids located in channels, rivers, etc.	• Content will be directed to rules of the road and consequences of non-compliance with rules of the road. In addition, the boater will be reminded of his obligation to display navigation lights, how to recognize displayed navigation lights on vessels and use of other displayed navigation aids. The presentation will involve highly visualized situations where the boaters will be challenged to determine correct interpretations of lights and aids.
• To maximize the boater's alertness to the total boating environment (i.e., awareness of the boat's position, other boater's course and speed, and the boater's own course and speed)	• Content will be directed to the maintenance of operator discipline during all boating operating situations. This includes dimensionalizing (segmenting) aspects of operator attentiveness, i.e., boat's position, other boaters' course and speed, and boater's own course and speed. Representative case histories of accidents will be presented with focus upon the consequences of operator inattention. Suggestions for how to remain alert will be given by "experts." Encouragement will be given for experimentation with avoidance maneuvers for alternative action in the event of marginal or imminent collision situations. This would normally include knowledge of the limitations and strengths of one's own boat, and mental rehearsal of alternatives very early in potential collision situations.
OBJECTIVES - RECOVERY OF ALL PERSONS	
• To encourage thoughtful ownership and use of PFDs for the boater.	• Content will deal with the advantages and limitations of each type of PFD. These advantages and limitations will be specific to the use of the PFDs in terms of: 1) convenient and accessible stowage 2) instructions for use and for donning PFDs 3) encouragement of boaters to don their own PFDs in simulated crisis conditions and 4) providing the boater with instructions as to how to determine if his boat has maximum, adequate, or insufficient PFD protection.

TABLE 12. OPERATIONAL OBJECTIVES AND MESSAGE CONTENT FOR COLLISION ACCIDENT EDUCATIONAL PROGRAM (concluded)

OBJECTIVES - RECOVERY OF ALL PERSONS	MESSAGE CONTENT
• To simulate resourceful thinking during the decision of the boater and others on board to remain with a swamped or capsized boat after the collision.	• Content will deal with the advantages and dangers of remaining with a swamped or capsized boat after an accident. Specific information will be given for: 1) equipment to carry in order to signal for assistance, to provide handholds and additional flotation, etc., that will provide assistance for persons in the water who are remaining with the distressed vessel 2) how to determine actual distance or best-estimate distance from shore in the event that the stricken boat sinks or assistance is unavailable 3) the deleterious effects of water temperature, wind conditions, and water conditions while in the water or attempting to swim to shore 4) if attempt to swim for shore is made, to take some form of flotation on the trip and 5) the need to have a rehearsed plan of response to a loading related accident.
OBJECTIVES - ASSOCIATED FACTORS	
• To call boaters' attention to the fact that there are several factors aside from actual causes of accidents that can contribute to the occurrence of an accident and that also can increase the severity of injury and likelihood of fatalities.	• Content will be directed to informing boaters of the contribution of associated human factors to the increased likelihood of occurrence of accidents, and possible resulting injuries or deaths. Information will include identification of the nature of each of these factors and the visualized consequences of exceeding the limits of these factors. It will be visually demonstrated that these factors influence the accident when they interact with marginally hazardous situations.

For example, in the first message given in Table 12, message content addressed two different informational items, i.e., rules of the road and navigation lights. Actual presentation of that information resulted in two separate production messages utilizing different media and delivery systems.

7.0 PART III - PRODUCTION AND CONSIDERATIONS FOR DISSEMINATION OF PROTOTYPE EDUCATIONAL PROGRAM

7.1 Selection of Educational Materials (Media and Production) and Delivery Systems for Developing and Disseminating Messages

The materials and delivery systems selected for implementing the educational objectives were based upon the known performance characteristics for the choices made in previous advertising and public service campaign efforts. Because each objective and the corresponding message content had their own unique requirements for execution, each had to be separately evaluated. Each objective and corresponding content was evaluated according to four areas of judgment. Evaluation was made by E. Sager (principal investigator), J. Berman, and J. Murray (consultants). These judgmental areas included:

- the complexity or nature of information to be communicated in the respective message(s)
- the identity of the group of boaters who would most benefit from the message(s)
- the specific environment in which the messages were to be received, e.g., in a formal boating class, or at home watching television
- cost of production, broadcast, or publication

7.2 Resources for Delivering the Educational Program to the Recreational Boater Public

Recommendations for delivering the educational program to boaters are the result of the consideration of several alternatives. These alternatives are identified in three general groups:

1. educational methods (i.e., lecture, conference or group discussion, case study, role playing, simulation - games, structured experience [laboratory training], and programmed instruction [programmed learning])
2. media and productions of messages (i.e., television spots, radio spots, pamphlets, newspapers, magazine articles, outdoor advertising, and advertising specialties
3. systems for delivery of the program (i.e., mass media - print and electronic, formal boating courses - USCG Auxiliary and Power Squadron, USCG visitation and vessel boarding, and home study materials for the boater)

The interdependency of the educational methods, media and production messages, and delivery systems is apparent in the logic of the following statement about educational materials:

> The mass media (delivery system) is utilized when a television spot (media and message) announces the conduct of a formal boating course (delivery system). In one evening class, a 35 mm slide show on navigation lights (media and message) is used to support the lecture (educational method) on the display and recognition of navigation lights. Programmed learning materials (educational method) given out for use after the completion of the course (home study delivery system) provide boaters with an on-going educational resource.

The various media and message production alternatives for delivery of a boater educational program are presented in the following section. They are organized within the various delivery systems. All reasonable media for use in an extensive boater educational program are given. However, the specific educational materials suggested in the collision accident educational program do not make exhaustive use of these alternatives. Instead, media, production messages, and delivery systems were selected in order to recommend an educational program of reasonable magnitude, and one that was most likely to produce a more cost effective effort.

7.2.1 Delivery System 1 - Utilization of Mass Media (Print and Electronic Format)

The use of mass media is directed to two principle purposes: instruction, and announcements concerning the availability of additional instructional information, such as the dates and time for conduct of a local Power Squadron Course. Media and productions which can be used are presented below in a brief, tabular format.

Pamphlets: consisting of single concept pamphlets dealing with aspects of loading related accidents, and factors associated with high risk for all accidents; materials are instructional in nature; provide factual information about boating, and suggest ways to increase one's skill in competent operation of boats. Distribution of the series of pamphlets could be accomplished by eight different means:

1. point of purchase displays at boating supply stores, beverage stores in geographic areas where recreational boating is extensive, and at fishing bait shops or hunting supply stores.

2. to accompany registration materials for boat licensing, fishing licensing, and hunting licensing; banks granting boat loans.

3. USCG Booth for display at Boating Trade Shows or boating competition events.

4. to accompany insurance policies that are purchased for boats.

5. to be distributed at boating and yachting clubs; boating and sailing schools.

6. direct mail sent to a sample of boaters; individual persons receiving materials are chosen from subscriber lists of boating magazines.

7. to be sent on request to individual boaters by USCG.

8. materials distributed within formal boating courses such as USCG Auxiliary, Power Squadron, Red Cross, Boy Scouts, etc.

Newspapers: consisting of a variety of printed materials some of which are instructional and some of which are intended only to remind boaters of prior instruction, or of the availability of additional instructional information. Seven alternative uses of the newspaper medium are possible:

1. information is sent intermittently to staff columnists who prepare a regular boating column; staff columnist interprets the message and supports the educational program for reduction of collision accidents; staff columnist is encouraged to follow guidelines for the basic approach and style adopted for the overall educational program.

2. advertising space is purchased for repetitive single concept materials; purpose is to stimulate recall of prior messages from the overall educational program; sports section is preferred.

3. filler material is prepared by educational program specialists, and is submitted to various newspapers in high boating accident areas; this material is published when space is available; "filler" information is both instructional and repetitive in nature.

4. press release intermittently given to local sports editors dealing with the running and progress of the educational program; to identify the program and keep it in the forefront of boaters' awareness.

5. "magazine" supplement inserted in Thursday's daily newspaper on a one time or serial basis per boating season; supplement consists of two or three critical collision-related concepts in programmed instruction format, highly visual in implementation, with recreational tone.

6. develop or encourage adaptation of a personal experience column to appear weekly in sports sections; message content stresses personal accounts of near or close calls with detailed reiteration of effective actions and decisions that prevented fatalities, injuries, or serious accident. The potential for personal experience as a vehicle for education is explored in the attitude study reported in the Loading-Related Accident Education report.

7. develop or refine a "question and answer" formal feature that focuses upon collision accidents; emphasis should be on regional rather than local boating to enable the presentation of several genuine questions per feature.

Magazines: consisting of a variety of printed materials some of which are instructional, some of which are intended to remind boaters of prior instruction, and some of which identify the availability of instructional information. At least five alternatives are possible:

1. provide short features in dealer oriented magazines (e.g., Boat and Motor Dealer, and The Boating Industry) identifying the new educational effort including the intentions and methods; provide useable information to be passed on to customers.

2. Insert instructional features in major airline passenger magazines; content may be modified programmed instruction in form and method (e.g., Sky for United Airlines and Airways for Delta Airlines).

3. purchase advertising space for repetition of prior educational messages as in newspaper utilization.

4. develop or encourage adaptation of existing "question and answer" features in magazines oriented toward the boating consumer, as in newspaper utilization; information should encourage use of sound boating practices and procedures.

5. develop features on personal experience, some of which might be taken from files of BARs with appropriate "masking" identification of actual persons involved, as in newspaper utilization.

Outdoor Advertising: consisting of purchase of several 24 and/or 30 sheet poster panel buys*; purchased poster panels should be located on roadways in higher boating accident areas; exposure should be during boating season; designed for initiating recall of prior educational messages.

Transit Advertising: consisting of purchase of poster panels for vehicles such as commuter buses and trains; panel design is identical to that for outdoor advertising poster panels; it is intended to elicit recall of prior educational messages.

Television: consisting of a variety of information, some of which concerns announcements about instructional opportunities (e.g., USCG Auxiliary or Power Squadron boating courses); some of which are actually instructional; and some of which are for initiating recall of previously learned material only (reminders):

1. a series of instructional spot messages, each of which are single concept in scope and intent; time length of 30 seconds each; messages are professionally produced and shown as public service announcements (PSAs).
2. a series of animated logos designed to accompany and complement instructional television and printed information; these are intended for local use, to be "tagged" by local boating organizations; "voice-overs" or the audio track can be made in the local station, and they should be shown during station break times as PSAs; maximum time length, 10 seconds.
3. press releases given intermittently to local sports reporters concerning the running and progress of the educational program; releases are timed to coincide with accelerations of print media distribution, with showings of 30 second spot messages, and with announcements about the conduct of formal boating courses.

Radio: consisting of spot announcements about instructional opportunities (e.g., Coast Guard Auxiliary or Power Squadron boating courses) and reminders of key points for recall of prior educational messages; each message is single concept in scope and intent; time lengths are 10 seconds and 30 seconds; messages are professionally produced and nationally distributed.

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* Single panel buys placed strategically along highways are an alternative to group purchases involving several panels where panels are placed to saturate a given area. For the usual group purchases the messages are intended to reach a more general population than the recreational boater.

7.2.2 Delivery System 2 - Utilization of Formal Boating Courses

The success of accelerated use of the formal boating courses in the educational program is dependent upon competent instructors who have access to high quality educational support materials. Recommended materials include the following items:

Pamphlets: consisting of the same series of single concept pamphlets used for printed mass media distribution; the complete set of pamphlets should be distributed or made available during the conduct of the boating course.

Moving Picture Films: consisting of two approaches for use of films in boating instruction: 1) one or two 16 mm films approximately 20 minutes in length;* each film deals with a single concept that addresses loading-related accidents; each film is to be professionally produced by a company with extensive experience in training films; prints of the film are to be made available to various Power Squadron courses, USCG Auxiliary courses, etc., on a regular basis (at their request) so that course units can be planned around their use 2) encouragement of local course instructors to experiment with Super 8 regular film or cassette cartridge film for presenting localized information visually; Super 8 film on reels or in cartridges can be purchased fairly reasonably at bulk purchasing rates; planning and shooting instructional manuals are available (Reference 4). Super 8 cameras and projectors are readily available for use from members of the organizations sponsoring the courses (see the Hope Reports on camera and video equipment purchased by various segments of the national population, Reference 5).

35 mm Slide Presentations: consisting of a series of single concept slide shows of about 40 slides each; intent of the slide shows is threefold: to conduct instruction for complex informational materials, to develop desirable attitudes toward competent operation of boats, and to present alternatives for developing of skill for competent operation of boats; it is recommended that three versions of each show be prepared by a professional production house; shows are to be circulated among local organizations sponsoring boating courses at their request; use of each show is to provide high-quality, visual, instructional materials to supplement conventional lectures used in various course units; the alternative versions for the slide shows are:

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* Twenty minutes of time when students are not directly interacting with the class instructor should not seriously detract from the student's concentration on material presented in the continuation of the lecture.

1. 40 slides consisting of photographic and special title/graphic slides in carousel magazine; magazines are not sealed so the sponsoring boating organization can put in their own identification slide for the presentation ("tag" slide); with "tone cueing" from accompanying audio cassettes; audio supplemental message is provided and no participation is required on the part of the course instructor to show the slides.

2. 40 slides prepared as above; audio supplemental message is provided on cassette tape and is accompanied by printed script; course instructor is required to follow along with the audio track and to manually advance slides at appropriate times indicated on printed script.

3. 40 slides prepared as above, distributed with suggested printed script only; instructor is required to deliver verbal information in lecture and to manually advance slides at appropriate times.

Video Tape Recording (VTR): one 30 minute tape each consisting of instructor briefing for the presentation of the instructional unit (one evening's presentation), and including a review of all materials for the unit; information included on the tape recommends how to best structure the evening's activities, how to present the various visual aids, options available for the unit (developed for the loading related educational program), and how to maximize class members' participation; VTRs are professionally produced and distributed to local organizations sponsoring regular boating courses *at their request;* VTR format recommended in 1/2 inch tape for use on widely available Sony 3600 series VTR playback units; additional information on how to present course units and various resources for assistance is presented in Subtasks III and IV, "Methods for Education" and "Mass Media Alternatives." respectively, in the Final Report for Educational Alternatives for Boating Safety Programs, 1978.

7.2.3 Delivery System 3 - Utilization of Visitation and Vessel Boarding Programs

The same basic instructional and audio/visual materials should be made available during formal lectures at school visits, at special events such as regattas, or at special workshops given by Universities, boating clubs, etc.

Pamphlets: consisting of the same series of single concept pamphlets used for mass media distribution, and "in class" distribution; in this delivery system, pamphlets are to be selectively distributed, i.e., instructional content for the particular pamphlets given out should reflect locally frequent accidents or should relate to the intentions of the visitation or boarding.

Advertising Specialties: consisting of an assortment of selected items; as a representative sample, the following were designed for the prototype boating safety program.

1. floating key chains with an imprint of the small boat - runabout education logo;* one version of the key chain also includes the reminder to "Stay With It" referring to resourceful thinking during a swamping or capsizing after the collision; identification of the floating characteristic of the key chain with resourceful survival strategies following an accident is intended.

2. imprints of the logos are suggested for accessories likely to accompany drinking of alcoholic beverages aboard the boat (e.g., resealable bottle caps, a strategy having precedent in some of the more progressive traffic highway safety programs); the intention here is to remind the boater that he is obligated to use alcohol in moderation, if at all, while operating his craft.

3. first aid kits and bandage dispensers imprinted with various education topical logos; the association of the educational program directly with safety related equipment and concepts is recommended; in the present program this has been done in a way that demonstrates the intentions of the program go beyond safety and first aid.

4. the production of highly reflective materials such as logo stickers; they offer great flexibility for use by boaters and can be related to several messages in the educational program; when fastened to equipment like oars, paddles, bailers, etc., these stickers facilitate locating the items in the dark; the assistance provided in locating certain items in the aftermath of an accident might help the boater to stabilize the crisis situation.

*See Appendix F-1 for a presentation of illustrative program logos.

5. pencil clips endorsed with the assortment of educational program logos; they assist in identifying the broad scope of the educational program; in fact no recreational boater is beyond the intentions of this program regardless of his experience or the size of his boat; the pencil clips are intended for use on larger craft where course plotting is required or where fuel consumption must be carefully calculated.

7.2.4 Delivery System 4 - Utilization of Home Study

The development of a systematic home study plan consists of a series of materials designed to complement other delivery systems. The materials should include the following items:

1. single concept pamphlets developed as a separate series adapted for home study use
2. programmed learning texts or magazine inserts in newspapers (see Delivery System 1, Section 7.2.1)
3. conventional television programming using approach employed in the "National Boating Test" sponsored by Johnson Outboard Motor Co., or local television station production of various accident related aspects of boating in a local area.

7.3 Illustrative Collision Educational Program

Various alternatives available for production were selected for use in the development of an illustrative program. The selected media and production messages, and the selected delivery system are presented in tabular form in Table 13. They are presented with the corresponding educational objectives for the collision education program. As was stated earlier, production messages are the executions of message content specified in Table 12. The rationale for selections made concerning the media and delivery system are also in tabular form, and are presented in Table 14.

TABLE 13. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR ILLUSTRATIVE COLLISION ACCIDENT EDUCATIONAL PROGRAM

OBJECTIVES - COLLISION AVOIDANCE	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
• To inform or remind boaters of their obligations with respect to rules of the road and with effective display of navigation lights and accurate recognition of others.	1) Television Spot (30 sec.) using animation to dramatize a situation having educational value for avoiding collision accidents; script provides a problem situation for which the solution is not given; viewer must call a telephone number for an answer and a recorded message stating when next CG Auxiliary course is taught in the area; visual and verbal strategy maximizes viewer's action/participation in receiving the message* 2) Television Spot (10 sec.) using computer animations of educational program logos; with locally produced audio track and tag*: - Rules of road, consequences for non-compliance, display of navigation lights, and accurate recognition of lights are materials to be taught within the formal boating course although the problem situation for the spot may be taken from these topics.	• Electronic Mass Media

* An illustrative production message was completed for this project. See video tape Supplement for the Education Alternatives for Boating Safety Programs, Final Report and the repository of materials.

TABLE 13. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR ILLUSTRATIVE COLLISION ACCIDENT EDUCATIONAL PROGRAM (continued)

OBJECTIVES - COLLISION AVOIDANCE	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
	3) 35 mm Slide Show (40 slides) explaining navigation light display for different classes of boats, and interpretation of navigation light configurations; all photos and art work are "point of view" of operator; extensive use of visualization, and question and answer format.* 4) Single Concept Pamphlet for rules of the road; extensive visualization and use of programmed instruction method and layout.	• Formal Boating Course (Coast Guard Auxiliary, etc.)
• To remind and instruct boaters on how to read accurately various navigation aids located in channels, rivers, etc.	1) 35 mm Slide Show (40 slides) explaining the systems of piloting aids (one show for each set of rules, e.g., Great Lakes; all photos and art work are "point of view" of operator; extensive use of visualization; question and answer format to maximize participation of audience*. (Example show does not use point of view method except for mid-channel buoy slide.)	• Formal Boating Course

* An illustrative production message was completed for this report. See video tape Supplement for the Education Alternatives for Boating Safety Programs, Final Report and the repository of materials.

TABLE 13. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR ILLUSTRATIVE COLLISION ACCIDENT EDUCATIONAL PROGRAM (continued)

OBJECTIVES - COLLISION AVOIDANCE	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
• To maximize the boater's alertness to the total boating environment (i.e., awareness of the boat's position, other boater's course and speed, and the boater's own course and speed).	1) 16 mm Film (20 min.) demonstrating the need for maintenance of operator discipline during all boat operating situations; film is to employ "point of view" visualization; expert professional production is imperative since objective is largely attitudinal in nature (i.e., strategies for maintaining operator discipline require positive valuing of the behavior).*	• Formal Boating Course
OBJECTIVES - RECOVERY OF ALL PERSONS		
• To encourage thoughtful ownership and use of PFDs for the boater.	1) Magazine Feature: state-of-the-art on PFDs published in boating enthusiast magazines* 2) Outdoor Advertising 3) Television Spot (10 sec.) using computer animation with locally produced audio track and tag*	• Electronic and Print Mass Media
• To stimulate resourceful thinking during the decision of the boater and others on board to remain with a swamped or capsized boat after a collision.	1) Super 8 mm (local productions by boating course instructor)* 2) Script given to local TV station for production using their facilities; includes information from special press kit	• Formal Boating Course • Electronic and Print Mass Media

* An illustrative production message was completed for this project. See video tape supplement for the Education Alternatives for Boating Safety Programs, Final Report and the repository of materials.

TABLE 13. OBJECTIVES, PRODUCTION MESSAGES AND MEDIA, AND DELIVERY SYSTEMS FOR ILLUSTRATIVE COLLISION ACCIDENT EDUCATIONAL PROGRAM (concluded)

OBJECTIVES - RECOVERY OF ALL PERSONS	PRODUCTION MESSAGES AND MEDIA	DELIVERY SYSTEM
	3) Radio Spot* (30 sec.) 4) Outdoor Advertising* 5) Television Spot (10 sec.) Computer Animation	
OBJECTIVE - ASSOCIATED FACTORS		
• To call boaters' attention to the fact that there are several factors aside from actual causes of accidents that can contribute to the occurrence of an accident and that also can increase the severity of injury and likelihood of fatalities.	1) Outdoor Advertising 2) Advertising Specialties*: (floating key chains, band-aid dispensers, plastic beverage glasses, etc.) 3) Newspaper Filler 4) Radio Spot* (30 sec.)	• Electronic and Print Mass Media • Visitation and Vessel Boarding

* An illustrative production message was completed for this project. See video tape supplement for the Education Alternatives for Boating Safety Programs, Final Report and the repository of materials.

TABLE 14. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS

OBJECTIVES - COLLISION AVOIDANCE	SELECTION RATIONALE
• To inform or remind boaters of their obligations with respect to rules of the road and with effective display of navigation lights and accurate recognition of others.	1) Television Spots (30 seconds) • Message should introduce awareness or remind boaters of their need to know about rules of the road, display of navigation lights, and accurate recognition of navigation light configurations; then message should provide a means to solve any information need boaters become aware of through an invitation to attend a formal boating course. • Spots would need to be sufficiently attractive visually in order to maximize the likelihood that they will be broadcast as PSAs at times when large audiences are viewing programs. • Television will provide local access to large numbers of boaters who are possible candidates for attending formal boating courses. • High credibility of the television medium in conjunction with well produced spots should provide enticement for boaters to attend formal boating courses. • Animation provides an ideal means for isolating the exact visual content necessary for the message; distractions normally found in real life filming can be eliminated; animation also can provide a more recreational tone with no sacrifice to message authenticity. 2) Television Spots (10 seconds) Using Computer Animation for Video, and Either Coast Guard or Local Audio Track • Complete flexibility on the part of the audio track and message since the logo is the only visual message given. • Visual animation of educational logos will add a dynamic attribute to the already familiar graphic symbols. • Local organizations or businessmen associated with marine equipment may "tag" the spot for public relations.

TABLE 14. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (continued)

OBJECTIVES - COLLISION AVOIDANCE	SELECTION RATIONALE
	• Cost is reasonable considering the number of exposures possible, and the number of messages that can be disseminated. • Above considerations for media access to boaters and credibility also apply. 3) 35 mm Slide Show for Formal Boating Course • Information about display and interpretation of navigation lights is essentially visual by definition and use. • Class environment is conducive to formal instruction in various configurations of navigation lights relative to course and bearing of boats involved. • Availability of highly visualized good quality slide presentations should encourage better instruction and better boater attendance at boating courses. 4) Single Concept Pamphlet on "Rules of the Road" • Provides take-home materials for home study, if well prepared and effective, pamphlets will likely be circulated among boaters' friends. • Cost will be notably higher than for present Coast Guard (CG) series since it is absolutely essential that the pamphlet be prepared by experienced professionals with no compormise for detail (see Part III of this report).
• To remind and instruct boaters on how to read accurate various navigation aids located in channels, rivers, etc.	1) 35 mm Slide Show for Formal Boating Course • Information about various navigation/piloting aids is essentially visual, i.e., visual markers for course and speeds for boat operation. • Class environment is conducive to formal instruction for a complete understanding of local and regional use of navigation/piloting aids. • Availability of highly visualized, good quality slide presentations should encourage better instruction and better boater attendance at boating courses.

TABLE 14. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEMS (continued)

OBJECTIVES - COLLISION ACCIDENT AVOIDANCE	SELECTION RATIONALE
• To maximize the boater's alertness to the total boating environment (i.e., awareness of the boat's position, other boater's course and speed, and the boater's own course and speed.	1) 16 mm Film (20 minutes) • High initial cost for production but if well executed, film can be shown in formal boating courses, at Coast Guard visitations, or at special requests for presentations. • Moving picture film offers the mobility to enact or actually report consequences of breakdowns of operator discipline which resulted in crashes; a good medium for dramatization of facts without distorting essential information. • Again, professional production is a necessity.
OBJECTIVES - RECOVERY OF ALL PERSONS	
• To encourage thoughtful ownership and use of PFDs for the boater	1) Magazine Feature • This print mass media message offers good potential to inform the committed boating enthusiast about current issues and developments in PFD research, including availability and effectiveness; media survey reported in the Education Alternatives for Boating Safety Programs, Final Report indicates that "informed boaters" are excellent sources for disseminating information. [It is likely that an article about PFDs targeted to less informed and less committed boaters would have not had the effectiveness of the informed opinions of a first hand knowledgeable person.] • Cost is moderate in that feature articles can be professionally prepared for less than $1,000; publication is dependent upon policy of various magazines.

TABLE 14. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEM (continued)

OBJECTIVES - RECOVERY OF ALL PERSONS	SELECTION RATIONALE
• To stimulate resourceful thinking during the decision of the boater and others on board to remain with a swamped or capsized boat.	1) Outdoor Advertising • Will keep PFD ownership and use at forefront of boating public's awareness. • Cost is relatively small for a single panel buy at approximately $200 per month. Art work and printing of panel sheets (for one panel only) are approximately $200. 2) Television Spot (10 sec.) using computer animation for video and either national or local copy for audio tracks • Computer animation should get prime time access as PSAs. • Will keep PFD ownership and use at forefront of boating public's awareness. • May interest local boating clubs in sponsoring the preparation of the audio tracks, perhaps using a local broadcasting personality; since the message is clearly public service and in the interest of all boaters, there would be good public relations value in participation in the spot. 3) Super 8 mm (local production by boating course instructor) • No cost to USCG other than encouragement incentive to boating organizations offering formal boating courses. • Local production is necessary since water temperature, boating traffic, maximum distances from shore, etc. vary locally. Super 8 can offer an interesting visual supplement to a very important message in the educational program.

TABLE 14. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEM (continued)

OBJECTIVES - RECOVERY OF ALL PERSONS	SELECTION RATIONALE
	4) Script given to Local TV Station for production using their facilities • Script and accompanying press kit should be prepared by professional agency with experience in boating and TV production; consequently, cost for script alone will be fairly high. Production and broadcasting are not to be financial concern for USCG other than to provide the technical information and incentive. • Local emphasis to message can be achieved; familiar terrain and shoreline can be used to create interest value and more important, to facilitate boaters' ability to use the message during a crisis in the water (familiarity increases transfer of information from the message to the opportunity for its use. 5) Radio Spot (10 seconds) • Cost: can be broadcast as PSAs; inexpensive to produce. • Will disseminate message to boater while enroute to the outing, or will reach boater while actually on the water. 6) Outdoor Advertising • Will disseminate message to boater and others in the boating party enroute to the outing. • Cost: see previous discussion. • Can be coordinated easily with complementary radio PSAs to add to overall effectiveness. 7) Television Spot (10 seconds) • Computer animation maximizes the possibility of prime time access as a PSA. • Can announce the offering of a boating course where messages will be disseminated by instructors in class. • Can keep thoughtful alternatives at forefront of boating public's awareness.

TABLE 14. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEM (continued)

OBJECTIVES - RECOVERY OF ALL PERSONS	SELECTION RATIONALE
	8) Advertising Specialties (floating key chains and reflective stickers of the educational program logos) • Floating key chains can communicate (subtly) the safety that is available by using flotation during the aftermath of a boating accident. • After an accident, reflective stickers may remind boaters of prior instruction on how to stabilize the situation and how to proceed with rescue (in the moments of collecting floating objects, etc.); in addition, the reflective surface may facilitate recovery of items in the darkness or speed the location of the distressed party by another rescue boat.
OBJECTIVE - ASSOCIATED FACTORS	
• To call boaters' attention to the fact that there are several factors aside from actual causes of accidents that can contribute to the occurrence of an accident and that also can increase the severity of injury and likelihood of fatalities.	1) Outdoor Advertising • Cost is relatively small for a single panel buy at approximately $200 per month. Art work and printing of panel sheets are approximately $200. • Will remind boaters of effects of associated factors while enroute to the boat outing. • Art work can be executed in ways that communicate the message but still retain a recreational tone (particularly if panels are located in resort areas or on resort property). 2) Advertising Specialties (reflective stickers of the educational program logos; placemats at resort restaurants; beverage bags; drinking glasses; resealable beverage bottle caps; first aid kits; and band-aid dispensers; imprinted with the educational logos) • Highly reflective stickers can be fixed to styrofoam ice chests, bottle openers, etc.

TABLE 14. RATIONALE FOR EDUCATIONAL MATERIALS, METHODS, AND DELIVERY SYSTEM (concluded)

OBJECTIVE - ASSOCIATED FACTORS	SELECTION RATIONALE
	• Logos printed on accessories to be used during drinking beverages (alcoholic and non-alcoholic) to remind boaters they are obligated to drink only in moderation, if at all while operating their craft. This strategy for reaching persons with educational messages while drinking has been used by some of the more progressive traffic safety programs. • First aid kits and band-aid dispensers are to associate caution and safety with the educational program; small wounds occurring after fatigue or excessive drinking may signal the boater that he is beyond his threshold for competent operation of this craft. 3) Newspaper Filler Press Kits • More than 80% of all non-advertising content in newspapers originates with the news source itself. • Cost is only for preparation of press kits. • Filler may be used repetitively on different days and in different sections of newspapers without loss of effectiveness. 4) Radio Spots (10 and 30 seconds in length) • 10 second versions permit insertion into rapid paced regular programming; these should invite broadcasting at day or evening times as PSAs. • 30 second versions can permit actual instructional messages. • Both 10 and 30 second versions provide access to boaters enroute to boating outing (in conjunction with outdoor advertising) and in some cases may actually be received on the water while boating.

7.4 Coordination of Production and Dissemination of Collision Educational Materials

The planning, production, and delivery of the educational messages require disciplined coordination if they are to be effective. This coordination is on three levels: systematic planning of content for the educational program using rigorous research methods to identify the exact intentions and scope of the program, the production of educational messages themselves which are tied into a common educational program using conventional strategies for that purpose, and the delivery of the messages which are timed according to requirements specified in the overall educational program.

The planning of content for the educational program is reported in depth in the first section of this report. In this project coordination of the production for the illustrative educational messages was accomplished by adhering to well defined guidelines. It was requested that all contractors producing messages conform to production specifications for this plan and whenever time permitted, these specifications were rigorously enforced. The intent of these guidelines was to achieve continuity among messages so that they would be perceived by boaters as related to the same comprehensive educational program. It is the collective or cumulative impact of these messages that produces the major effectiveness of this program. The production guidelines actually given to the participating contractors were as follows:*

1) All messages should reflect the combined tone of recreational quality and authenticity of content and sources.

2) Illustration style and photography style should be standardized. (Samples of illustrations, drawn by a commercial artist were prepared early in the program.) Photographs were to reflect an orientation of vicarious participation in the action where ever possible; i.e., photos should be shot from audiences' "point of view."

3) Similar type fonts should be used where possible; the preferred type fonts were optima and garamond.

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*There is always a problem of enforcement of these kinds of guidelines. It is suggested that the administrator of the educational program provide this information to the contractor at the onset of the production, and maintain sufficient contact during the production period that necessary revisions in the production are minimized.

4) Similar paragraphing and copy styles for both print and electronic media should be used; paragraphing should be short and well defined in order to invite reading; extensive use of titles or headings was recommended; copy style was to use repetition and question/answer format where content and media permitted. Two repetitive devices were recommended:

"As a boater..." initiating paragraphs
"Remember..." initiating reiterated materials.

5) The educational program graphic symbols (logos) were to be used.

6) The educational program colors (international orange, blue, and white) should be used on covers for pamphlets, in illustrations, in photographs, on advertising specialties, etc.

7) All messages were to be consistent with the theme of the educational program, i.e.,

A boater is obligated to be knowledgeable and skilled in the operation of his boat. It was emphasized and strictly enforced that the production messages did not make direct reference to boating safety. Rather, contractors were to make references to competent seamanship, knowledgeability, and boater expertness and skill. It was taken that a boater who is knowledgeable and skilled will be the more competent operator and less likely to be involved in an accident. Further, this boater is more likely to survive an accident if it does happen, and to facilitate the survival of others.

The coordination of timing for an actual educational program is suggested where two or more messages are to be disseminated at complementary times. Other timing would be suggested by accident statistics, boating events that attract attention in and of themselves, and by USCG policy and judgment. Since no messages in this project were actually delivered, emphasis was on the research and production of prototype messages rather than on apsects of program coordination.

7.5 Production of Prototype Messages

Several messages were produced as illustrative educational materials. In some cases, these were exemplary; others should be revised or redone if actually used. Since the work of production was accomplished by 10 different contractors in only six months, quality of the finished product could be expected to vary. In some cases, preferred production contractors could not be used because of the time demands for finishing this project. Critiques of the materials are not available; however, those materials of sufficient quality for broadcasting or publishing are readily identifiable. It should be noted that, as a general rule, the younger artists, animators and writers used for the program proved to be easy to work with, produced excellent quality work, and priced their work moderately.

The messages included for the illustrative production were chosen to provide an assortment of media, educational methods, and production format for this project (and in conjunction with the loading-related education project). An itemization of the materials prepared for the collision educational program and the producing contractors is given in Table 15.

Most of the prototype production materials are available for inspection and study. They are also "showcased" in the context of an actual educational program in the video tape supplement to the Educational Alternatives for Boating Safety Programs report. It should be noted that the programs presented in this collision accident education report, in the Pleasure Boat Loading-Related Education report and in the Educational Alternatives for Boating Safety Programs report are one and the same program, and are recommended as a comprehensive USCG effort. However, any participation on the part of state or local agencies or private organizations in an actual operational educational program would be strictly voluntary. The intentions of the recommended program are to provide the best possible resources for conducting a nationwide boating educational program that is designed to reduce loading related and collision boating accidents and fatalities. Excepting the obvious mass media production, these resources are to circulate among persons and organizations interested in conducting local educational programs (only at their request). Mass media efforts can be initiated on the part of the Coast Guard without any notable interference with local or private educational programs. In addition, the mass media should have the effect of generating local interest in participating actively in the educational program.

TABLE 15. EDUCATIONAL MATERIALS PRODUCED FOR THE COLLISION ACCIDENT EDUCATIONAL PROGRAM WITH PARTICIPATING CONTRACTORS

PRODUCTION	CONTRACTORS
Graphic symbols (logos) (See Appendix F-1)	Porter Smith-Thayer/Porter Graphics 14-1/2 S. Court Street Athens, Ohio 45701
(1) 30 second television spot for collision education using animation. See Appendix F-2; film is on file.	Fingers Animation (P.O. Box 5259, Atlanta, GA 30307), and Oglesby Harden, Inc. (sound studio) (1820 Briarwood Industrial Court, Atlanta, GA 30329) Written by J. Murray, (Ohio University, Athens, OH 45701)
(3) 10 second television spots using computer animation of education logos. See Appendix F-3 for scripts, video tapes; 2 in. and 3/4 in. are on file	Produced by Computer Image Corporation (2475 West Second St., Suite 4, Denver, CO 80223) with P. Zimmerman, D. Holman, J. Berman (consultant) (Ohio University, Athens, OH 45701), and E. Sager
(2) 35 mm slide shows, one for navigation lights. See Appendices F-4 and F-5 for scripts; slides are on file.	Written and photographed by Arbus Films (8005 Navios Drive, Huntsville, AL 35802)
Storyboard for 20 minute 16 mm film on collision accidents. See Appendix F-6 for the suggested script and a reduced photo reproduction. Actual storyboard is on file.	Written and drawn by Arbus Films (8005 Navios Drive, Huntsville, AL 35802)
Magazine feature on PFD ownership and use. See Appendix F-7 for copy only; "paste'up" is on file.	F. Ainsworth, Outdoor Empire Publishing (511 Eastlake Ave., E., P.O. Box C-19000, Seattle, WA 98109)
Advertising specialties. See Appendix F-8 tape supplement for this report.	The Riley Company (925 Henderson Rd., NW, Huntsville, AL 35805) and Pro Screen Company (1310 Buford St., P.O. Box 3374, Huntsville, AL 35805)

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1. MacNeill, R., C. Stiehl, S. Cohen, and T. Doll, Recreational Boat Safety Collision Research-Phase II, Vol. I, Problems Definition; Safety Enhancement Concepts. Contract DOT-CG-40672-A, July 1976. NTIS # AD A036 577.

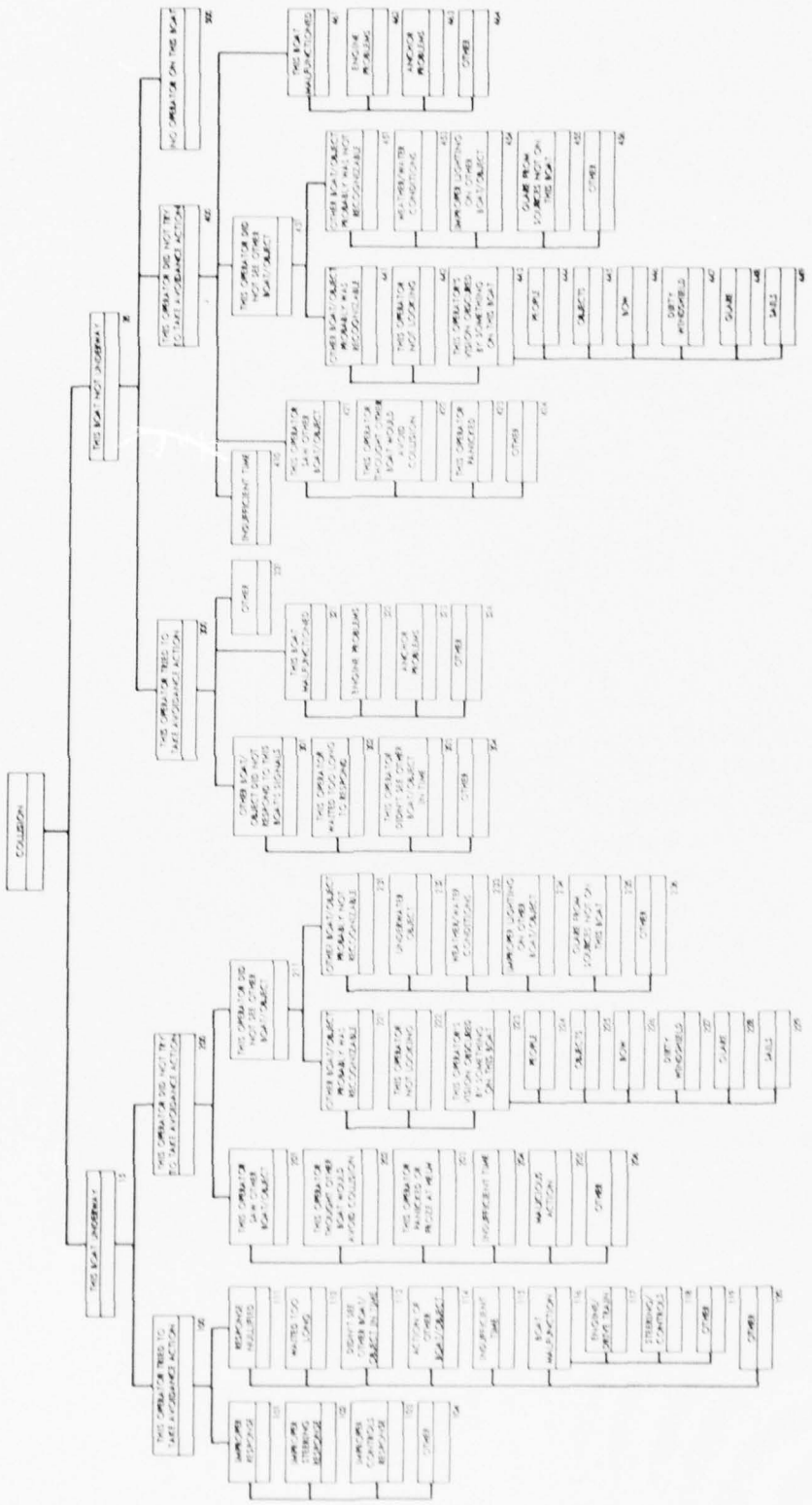
2. Wulfsburg, R.M. and D.A. Lang, Recreational Boating in the Continental United States in 1973: The Nationwide Boating Survey, Final Report to USCG, October 1974.

3. Kibler, R.J., D.J. Cegala, D.T. Miles, and L.L. Barker, Objectives for Instruction and Evaluation, Boston: Allyn and Bacon, Inc., 1974.

4. Handbook of Super 8 Production, New York: Media Horizons Press, 1976 (United Business Publications, Deptl MD77C, 750 3rd Avenue, New York, NY 10017).

5. Hope Reports Video II, Vol. 3, 1974 Series, Rochester, NY: Hope Reports, Inc., 1975.

APPENDIX A. COLLISION CAUSE IDENTIFICATION TREE (see Reference 1)



APPENDIX B. DEFINITIONS OF CAUSES USED IN THE COLLISION CAUSE IDENTIFICATION TREE (see Reference 1)

15	This boat underway	- The boat has to be moving in relationship to the bottom.
100	This operator tried to take avoidance action	- You know that the operator saw the other boat/object and that he probably made some effort to maneuver his boat to avoid the collision. Code this block if you don't know what that action was.
101	Improper response	- The operator made an improper response; however, we aren't sure what it was. This box will seldom be used since we should, normally, know what the response is if we are sure that the response was improper.
102	Improper steering response	- The operator didn't turn enough, turned too sharp, turned the wrong way, etc.
103	Improper controls response	- The operator moved the wrong lever, pushed it the wrong way, etc.
104	Other	- Any improper response that isn't covered above. Code "other" when you know what the response was and know it was the wrong response. Code "improper response" when you don't know exactly what the wrong response was.
111	Response nullified	- The operator attempted to avoid the collision, but something happened after his avoidance attempt to cause the collision to occur anyhow. Code this block when you are sure of the above statement, but aren't certain what that action was.
112	Waited too long	- The operator saw the other boat/object for some length of time before the accident, but didn't take an avoidance action until it was too late.
113	Didn't see other boat/object in time	- The other boat/object was visible for a period of time before this operator took the avoidance action. There is a good possibility that if the avoidance action would have been made at the time that the other boat/object became visible, the collision could have been avoided.
114	Action of other boat or object	- The other boat or object was totally at fault. It made some action that caused the collision to become unavoidable no matter how hard this operator tried to avoid it.

115	Insufficient time	- For some reason, the period of time between the time that the other boat/object first became visible and the time that the collision occurred was so short that the avoidance action was ineffective.
116	Boat malfunction	- Something on the boat malfunctioned causing the avoidance action to be ineffective. Code this block when you aren't certain what actually failed.
117	Engine/Drive train	- The failure that caused the avoidance action to be ineffective was in one or more of the following systems: engine or any attached accessories, gear box, propeller shaft, strut, propeller, rudder, outdrive, or attachment mechanisms.
118	Steering/Controls	- The failure that caused the avoidance action to be ineffective was in one or more of the following systems: steering wheel, steering wheel mechanism, steering cables or pulleys, steering attachment at the rudder end, shift or throttle controls, mechanisms, cables, pulleys or attachment mechanisms.
119	Other	- Something on the boat malfunctioned causing the avoidance action to be ineffective. Code this block when you know what malfunctioned and it was something other than engine/drive train or steering/controls.
120	Other	- The operator took an avoidance action, but that action was nullified by anything other than what is detailed above.
200	This operator did not try to take avoidance action	- Code this block when the probability exists that this operator did not try to take any avoidance action, but you don't know why. You don't know if this operator saw the other boat/object.
201	This operator saw other boat/object	- You know that this operator did not try to take any avoidance action and he did see the other boat/object. You don't know why he did not take avoidance action.
202	This operator thought other boat would avoid collision	- This operator did not try to take any avoidance action even though he saw the other boat because he thought the operator of the other boat would maneuver to avoid the collision.

203	This operator panicked or froze at helm	- This operator did not try to avoid the collision even though he saw the other boat/object because he panicked or froze at the helm.
204	Insufficient time	- The other boat/object appeared so suddenly that there wasn't enough time to take a collision avoidance action.
205	Malicious action	- This operator deliberately tried to place his boat in the collision situation. It may have been because of a dislike for the other person or a desire to see him suffer or it may have been a causeless mischievous impulse.
206	Other	- You know that the other boat/object was seen. You also know that the collision avoidance action was not made for a reason other than those listed above.
211	This operator did not see other boat/object	- You know that this operator did not try to take any avoidance action and he did not see the other boat/object. You don't know why he did not see the other boat/object.
221	Other boat/object probably was recognizable	- You feel certain that the other boat/object could have been seen by most people in the identical situation. Code this block if you don't know why this operator didn't see the other boat/object.
222	This operator not looking	- This operator did not see the other boat/object because he wasn't looking in that direction just prior to the collision.
223	This operator's vision obscured by something on this boat	- The other boat/object was probably recognizable, but this operator didn't see it because of an obstruction on this boat. You aren't sure what was in his line of sight.
224	People	- This operator didn't see the other boat/object because people on this boat were obstructing his view.
225	Objects	- This operator didn't see the other boat/object because an object on this boat obstructed his view.
226	Bow	- This operator didn't see the other boat/object because this boat's bow obstructed his view.
227	Dirty windshield	- This operator didn't see the other boat/object because of spray, salt, dirt, etc., on this boat's windshield.

228	Glare	- This operator didn't see the other boat/object because of glare problems. This can be reflected glare off the water, or off something on this boat. It can also be direct glare from the sun, moon, or any light source.
229	Sails	- This operator didn't see the other boat/object because this boat's sails obstructed his view.
231	Other boat/object probably was not recognizable	- You feel certain that the other boat/object could not have been seen by most people in the identical situation. Code this block if you don't know the reason that it could not have been seen.
232	Underwater object	- This boat hit an underwater object that was not recognizable.
233	Weather/Water conditions	- This operator did not see the other boat/object because the weather conditions or water conditions were so severe. This includes rain, fog, snow, and high waves and assumes that the boat was equipped with weather protection devices normal to similar craft.
234	Improper lighting on other boat/object	- Other boat/object probably was not recognizable by the majority of boaters because it was improperly lighted or not lighted at all.
235	Glare from sources not on this boat	- The other boat/object probably was not recognizable because of glare or lights on the shoreline, on bridges, or causeways or any other source that could effectively mask the navigation lights or the shape of the other boat.
236	Other	- The other boat/object was not recognizable for a reason other than that detailed above.
35	This boat not underway	- The boat is not moving relative to the bottom. The power may be on and, in fact, it may be in gear, but it isn't moving over the bottom.
300	This operator tried to take avoidance action	- You know that the operator saw the other boat/object and that he made some effort to signal or get his boat moving to avoid the collision. Code this block if you don't know what that action was.
301	Other boat/object did not respond to this boat's signals	- Someone on this boat signalled other boat (waved PFDs, used flashlight, etc.), but other boat's operator did not respond at all or not in time to avoid collision.

302	This operator waited too long to respond	- This operator saw other boat, and for some length of time did nothing. When he finally attempted to signal or take an avoidance action, it was too late.
303	This operator didn't see other boat/object in time	- For some reason, the interval between the time that this operator saw the other boat and the collision was too short to signal or take an avoidance action.
304	Other	- Code this block if you know that the operator saw the other boat/object and that he made a specific effort to signal or take an avoidance action other than those detailed above.
321	This boat malfunctioned	- Code this block if you know that this operator tried to get underway, but couldn't. You don't know why he couldn't.
322	Engine problems	- The operator tried to start the engine, but couldn't.
323	Anchor problems	- Someone on board this boat attempted to weigh anchor, but couldn't for some reason such as: anchor caught in some object, anchor line tangled, current too strong so anchor line couldn't be pulled in, or engine was started and boat was underway before anchor line was pulled in. Result, line tangled in propeller.
324	Other	- Code this block when a specific boat malfunction occurred other than the two listed above.
331	Other	- Code this block when the operator tried to take a specific avoidance action or made a specific signal that won't fit in any other block.
400	This operator did not try to take an avoidance action	- You know that the operator saw the other boat/object, but he did not make any effort to signal or get his boat moving to avoid the collision. Code this block if you don't know any more details.
410	Insufficient time	- He didn't take any avoidance action because he didn't have time.
421	This operator saw other boat/object	- Code this block if you know that the operator saw the other boat/object, but you don't know anything else.

422	This operator thought other boat would avoid collision	- This operator saw the other boat coming, but didn't signal or attempt to take an avoidance action because he thought the other boat would eventually change course and wouldn't hit him.
423	This operator panicked	- This operator saw the other boat coming at him and obviously panicked or froze.
424	Other	- This operator saw the other boat coming at him and did not try to take any avoidance action for a specific reason other than those mentioned above.
431	This operator did not see other boat/object	- You know that this operator did not try to take an avoidance action because he did not see the other boat/object. Code this block only if you don't know whether the other boat/object was recognizable.
441	Other boat/object probably was recognizable	- You feel certain that the other boat/object could have been seen by most people in the identical situation. Code this block if you don't know why this operator didn't see the other boat/object.
442	This operator not looking	- This operator did not see the other boat/object because he wasn't looking in that direction just prior to the collision.
443	This operator's vision obscured by something on this boat	- The other boat/object was probably recognizable, but this operator didn't see it because of an obstruction on this boat. You aren't sure what was in his line of sight.
444	People	- This operator didn't see the other boat/object because people on this boat were obstructing his view.
445	Objects	- This operator didn't see the other boat/object because an object on this boat obstructed his view.
446	Bow	- This operator didn't see the other boat/object because this boat's bow obstructed his view.
447	Dirty windshield	- This operator didn't see the other boat/object because of spray, salt, dirt, etc., on this boat's windshield.

448	Glare	- This operator didn't see the other boat/object because of glare problems. This can be reflected glare off the water, or off something on this boat. It can also be direct glare from the sun, moon, or any light source.
449	Sails	- This operator didn't see the other boat/object because this boat's sails obstructed his view.
451	Other boat/object probably was not recognizable	- You feel certain that the other boat/object could not have been seen by most people in the identical situation. Code this block if you don't know the reason that it could not have been seen.
453	Weather/Water conditions	- This operator did not see the other boat/object because the weather conditions or water conditions were so severe. This includes rain, fog, snow, and high waves and assumes that the boat was equipped with weather protection devices normal to similar craft.
454	Improper lighting on other boat/object	- Other boat/object probably was not recognizable by the majority of boaters because it was improperly lighted or not lighted at all.
455	Glare from sources not on this boat	- The other boat/object probably was not recognizable because of glare or lights on the shoreline, on bridges, or causeways or any other source that could effectively mask the navigation lights or the shape of the other boat.
456	Other	- The other boat/object was not recognizable for a reason other than that detailed above.
461	This boat malfunctioned	- Code this block if you know that the operator didn't try to signal and didn't try to take an avoidance action because he knew he had a malfunction. You aren't sure what type of malfunction occurred.
462	Engine problems	- The operator knew the engine wouldn't start or the boat wouldn't move due to engine or drive train problems.
463	Anchor problems	- The operator didn't even try to weigh anchor because he knew he couldn't get it up.
464	Other	- Something on the boat malfunctioned causing it to be dead in the water. Code this block when you know that the operator didn't try to signal, didn't try to take an avoidance action, and you know what malfunctioned and it wasn't the engine, drive train, or anchoring problems.
500	No operator on this boat	- The boat is anchored, moored, or docked with nobody aboard.

APPENDIX C. FREQUENCY OF BOATS IN ACCIDENTS FOR THE COLLISION CAUSES

Collision Causes (Includes Only the Causes Attributed to One or More Accidents)		Frequency of Boats in Accidents (Attributed to the Causes)	Frequency of Unweighted Fatalities (Attributed to the Causes)	Frequency of Boats in Accidents When One or More Fatalities Occurred (Attributed to the Causes)
15*	This boat underway	149	69**	56
100	This operator tried to take avoidance action	48	23	16
101	Improper response	7	2	2
102	Improper steering response	4	2	2
103	Improper controls response	2		
104	Other	1		
111	Response nullified	38	15	11
112	Waited too long	1	1	1
113	Didn't see other boat/object in time	12	5	3
114	Action of other boat/object	8	5	4
115	Insufficient time	4	3	2
116	Boat malfunction	10		
117	Engine/Drive train	1		
118	Steering/Contols	8		
119	Other	1		
200	This operator did not try to take avoidance action	84	38	33
201	This operator saw other boat/object	20	7	5
202	This operator thought other boat would avoid collision	6	3	1
204	Insufficient time	7	3	3
205	Malicious action	1		
206	Other	2	1	1

APPENDIX C. FREQUENCY OF BOATS IN ACCIDENTS FOR THE COLLISION CAUSES (continued)

Collision Causes (Includes Only the Causes Attributed to One or More Accidents)		Frequency of Boats in Accidents (Attributed to the Causes)	Frequency of Unweighted Fatalities (Attributed to the Causes)	Frequency of Boats in Accidents When One or More Fatalities Occurred (Attributed to the Causes)
211	This operator did not see other boat/object	59	31	28
221	Other boat/object probably was recognizable	29	7	15
222	This operator not looking	16	9	8
223	This operator's vision obscured by something on this boat	4		
226	Bow	2	1	1
229	Sails	1		
231	Other boat/object probably not recognizable	24	8	8
232	Underwater object	14	4	4
233	Weather/Water conditions	2		
234	Improper lighting on other boat/object	6	4	4
235	Glare from sources not on this boat	1		
35	This boat not underway	12	1	2
400	This operator did not try to take avoidance action	9	1	2
410	Insufficient time	2		
431	This operator did not see other boat/object	2		
441	Other boat/object probably was recognizable	2		
442	This operator not looking	2		

APPENDIX C. FREQUENCY OF BOATS IN ACCIDENTS FOR THE COLLISION CAUSES (concluded)

Collision Causes (Includes Only the Causes Attributed to One or More Accidents)		Frequency of Boats in Accidents (Attributed to the Causes)	Frequency of Unweighted Fatalities (Attributed to the Causes)	Frequency of Boats in Accidents When One or More Fatalities Occurred (Attributed to the Causes)
461	This boat malfunctioned	1	1	1
462	Engine problems	1	1	1
500	No operator on this boat	1		

* Indention of collision cause code numbers indicates relative position of the causes in the Collision Cause Tree.

** Values do not reflect the total number of fatalities for these accidents since two causes were usually given for the fatalities in the two boat collisions. For example, when two boats collided and three persons died, each of the two accident causes were linked to the three fatalities.

APPENDIX D. FORM USED TO TABULATE HUMAN FACTORS ASSOCIATED WITH COLLISION ACCIDENTS

			Yes	No	Unknown	N/A
1.	How long had this operator been on water? _____ Hrs					
2.	This operator was:	Sober				
3.		Had been drinking				
4.		Was legally drunk				
5.	This operator subjected to high amount of:	Shock/Vibration				
6.		Noise				
7.		Glare				
8.	*Human engineering* problem with control station or controls					
9.	Just prior to the collision, this operator:	Was in proper position				
10.		Was looking away				
11.		Was at the helm				
12.		Made a navigational error				
13.		Was operating in a reckless or malicious manner				
14.		Signalled other vessel				
15.	If this collision occurred at night, were the lights legal on this boat?					
16.	Was this boat priviledged?					
17.	Before the collision, this boat was:	Proceeding too fast for conditions				
18.		Out of control				
19.		In hazardous waters				

APPENDIX E. INSTRUCTIONS FOR DETERMINING EDUCATIONAL OBJECTIVES FOR BOATER TRAINING

INTRODUCTION TO THE EDUCATIONAL OBJECTIVES TASK

The plan for preparing the statement of objectives includes two steps. First, the pre-accident conditions and primary accident initiators will be linked to the boat operators' decisions and behavior prior to and during the accidents. This procedure may call for additional analyses of the collision accident data, but this is only a contingency at this time. Various occurrences of the accidents in the accident data base and the relevant decisions and behavior will be identified as specifically as possible. In addition, the conditions within which the accidents tended to occur will be specifically identified, where relevant. The second step for preparing the objectives will be the incorporation of the accident and operator information into several statements (probably declarative) that specify exactly what behavior the operational programs should address. Alternatives for operator behavior may include the following items:

- avoidance of conditions in which the high frequency accidents tend to occur
- how to handle the operation of the boat in such a way that the collision accident does not occur
- how to stabilize the crisis after the collision accident has occurred
- how to prevent fatalities after the collision accident has occurred.

APPENDIX E. INSTRUCTIONS FOR DETERMINING EDUCATIONAL OBJECTIVES FOR BOATER TRAINING

This task calls for the evaluation of certain aspects of the operation of recreational boats. You are being asked to review several reports each of which deals with a separate boating accident. The accidents are grouped according to the kind of accident that occurred and according to the general cause of the accident. For example, one group of accidents to be reviewed is "swampings" caused by the wake of a passing boat.

You are asked to determine exactly what the operator of the boat involved in the accident could have done to avoid the accident - what he should have done or what he should have known. The only constraint on selecting the alternative actions for the operator is to offer a plausible decision or action that is consistent with the conditions in which the accident occurred. You should find a great many duplications in your judgments since these accidents are already grouped according to accident type and accident cause. If you can not decide on a realistic alternative action or decision, go on to the next accident report. The alternatives should be readily available if enough information is given in the accident report. If the operator chose the right alternative, but it was not successful in avoiding the accident, go ahead and list it as an alternative.

Jot down your alternative for the operator on the worksheets provided. Please indicate the Wyle serial number for the accident report in the column to the left. Be sure you are recording the information on the worksheet for that particular accident type and accident cause. The statements you make concerning the operators' alternatives for each accident type and accident cause will then be processed, grouped into one or two overall solutions for the accidents, and rewritten as objectives for an educational program directed to recreational boaters.

APPENDIX E. WORKSHEET FOR EDUCATIONAL OBJECTIVES

ACCIDENT TYPE:

ACCIDENT CAUSE:

WYLE SERIAL NUMBERS FOR ACCIDENT REPORTS	BOAT OPERATOR ALTERNATIVE ACTIONS AND DECISIONS THAT WOULD AVOID THE ACCIDENTS (Indicate duplications using slash [/] tally marks)

APPENDIX F-1. LOGOS FOR COLLISION AND LOADING-RELATED ACCIDENT EDUCATIONAL PROGRAMS

General endorsing logo for all the educational materials - used for official messages, and used in conjunction with other typical logos to authenticate content at end of materials.

Identification logo for educational materials concerning smaller boats including jonnboats, outboard runabouts, and inboard/outdrive runabouts.

Identification logo for educational materials concerning larger boats including cabin and offshore cruisers.

Identification logo for educational materials concerning sailboats and more sophisticated aspects of seamanship.

Identification logo for educational materials concerning navigation and piloting.

APPENDIX F-2. SCRIPT FOR TELEVISION SPOT (30 SECONDS) USING ARTIST ANIMATION*

	Video		Audio
(00:00)	FADE IN	1.	ANNOUNCER (VO):
	BLUE BACKGROUND, WORDS APPEAR ONE-BY-ONE AS ANNOUNCER READS THEM.	2.	When you go out in a boat, other boaters
		3.	are assuming that you know the
		4.	rules of the road. . .
	FADE OUT WDS "DO YOU?"	5.	Do you?
	DISSOLVE TO POINT-OF-VIEW SHOT THRU BOAT'S WINDSHIELD AS ANOTHER BOAT APPROACHES FROM HEAD-ON.	6.	(FADE IN SFX: WATER AND MOTORBOAT)
		7.	Suppose another boat approaches you
		8.	and signals two blasts. (SFX: BOAT
	"BLAST LINES" APPEAR	9.	APPROACHING, BLAST BLAST)
(00:15)	FREEZE-FRAME	10.	What do you do? (PAUSE) (SFX OUT)
	DISSOLVE TO BLUE BACKGROUND	11.	Want to find out?
	COAST GUARD LOGO FLOATS DOWN AND SETTLES ON LOWER THIRD OF SCREEN.	12.	For a recorded answer, call the
		13.	Coast Guard at
	1-800-594-6000 APPEARS A CHUNK AT A TIME IN MIDDLE OF SCREEN.	14.	1-800-594-6000 ("ONE, EIGHT-HUNDRED,
		15.	FIVE, NINE, FOUR, SIX-THOUSAND").
	"YOU'RE OBLIGATED TO KNOW, YOU KNOW" APPEARS A WORD AT A TIME AT TOP OF SCREEN.	16.	We'll tell you what's meant by two blasts.
		17.	Because if you're a boater, you're obligated
		18.	to know, you know.
	EDUCATIONAL LOGO APPEARS NEXT TO COAST GUARD LOGO	19.	(SFX: DING DING)
	FADE TO		
(00:28)	BLACK	20.	FADE TO BLACK

* This script is for the "model" 30 second television spot that was tested with "less participative" spots in Part III of the Educational Alternatives for Boating Safety final report.

APPENDIX F-3. SCRIPT FOR TELEVISION SPOTS (10 SECONDS EACH) USING COMPUTER ANIMATION OF EDUCATIONAL LOGOS*

Example using Outboard Runabout Logo Animation:

"DO YOU KNOW ALL YOU WANT TO KNOW ABOUT POWER BOATING? A U. S. COAST GUARD AUXILIARY COURSE STARTS JANUARY 17. CALL YOUR MARINE DEALER FOR DETAILS."

Example using Navigation/Piloting Logo Animation:

"INTERESTED IN BRUSHING UP ON YOUR NAVIGATION SKILLS? A U. S. POWER SQUADRON COURSE STARTS JANUARY 17. CALL YOUR MARINE DEALER FOR DETAILS."

Example using General Endorsing Logo Animation:

"DO YOU KNOW IF YOUR PFDS WILL SUPPORT THE SAME WEIGHT AS LAST YEAR? PFDS LOSE BUOYANCY AS THEY AGE. TRY YOUR PFDS BEFORE BOATING THIS SEASON."

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* Audio track prepared by the Coast Guard can be included; however, an alternative utilization of the computer animations is to have messages written locally in conjunction with the national program objectives. Audio track is then recorded at a local television station.

APPENDIX F-4. SCRIPT FOR 35 MM SLIDE SHOW ON NAVIGATION/PILOTING AIDS

TITLE: NAVIGATION AIDS - SIGNPOSTS FOR BOATERS

Notes to Instructor:

1. Review materials before presentation. The slides are numbered.
2. Be sure they are in the proper order.
3. Where (PAUSE) occurs in the text, this indicates the instructor should wait for the class to respond, before moving on to next sentence.
4. Explain to class that returning from seaward (as entering a river) that the red or white colors, whether lights, paints, etc., are on starboard side and green or white are on port side. The mnemonic to remember is "red right returning."

Narration:

Slide #1

THE UNITED STATES COAST GUARD IN COOPERATION WITH (insert the name of your organization) IS PLEASED TO PRESENT THIS PROGRAM FOR THE FURTHERING OF YOUR EDUCATION IN SEAMANSHIP SKILLS.

Slide #2

(No Narration)

Slide #3

(No Narration)

Slide #4

THIS VIEW SHOWS A MYTHICAL PLACE IN WHICH A CHANNEL COMING IN FROM THE OCEAN AND ANOTHER CHANNEL FROM A CONVERGING RIVER, MERGE.... YOU WILL NOTICE THAT

THERE IS A REPRESENTATIVE GROUP OF BUOYS SHOWN HERE; CAN BUOYS, NUN BUOYS, JUNCTION BUOYS, FISH NET AREA BUOYS, FIXED DAYBOARDS WITH APPROPRIATE SIGNS ON THEM, AND SAFE ANCHORAGE BUOYS.... THE VARIOUS AIDS WILL BE DISCUSSED IN MORE DETAIL, AS THE PRESENTATION PROCEEDS.... THIS SCENE IS TO GIVE YOU AN OVERALL VIEW OF OUR THEORETICAL AREA THAT WE WILL BE DISCUSSING... HOW MANY OF THESE AIDS DID YOU RECOGNIZE? PLEASE ASK ANY QUESTIONS AT ANY TIME...

Slide #5

THE AMERICAN BUOYAGE SYSTEM IS COMPOSED OF TWO TYPES OF WHICH THE FIRST AND MOST DOMINANT IS THE LATERAL SYSTEM.... THE SECOND SYSTEM IS THE CARDINAL ARRANGEMENT... THE CARDINAL SYSTEM IS SOMETIMES USED ON NAVIGABLE LAKES AND STREAMS THAT ARE NOT CONNECTED TO OTHER FEDERAL NAVIGABLE WATERS... THE PRIMARY BUOYAGE SYSTEM IS THE LATERAL SCHEME... THE EASIEST WAY TO LEARN AND REMEMBER THIS SYSTEM, IS THAT THE VARIOUS BUOYS AND AIDS ARE ALWAYS TELLING YOU TO STAY TO ONE SIDE OR THE OTHER OF THEM, WHEN PASSING... SO THINK OF IT IN THOSE TERMS, JUST STAY AWAY FROM THE BUOYS: THAT MEANS THAT HORIZONTALLY OR LATERALLY YOU KEEP CLEAR OF THE PARTICULAR BUOY YOU ARE OBSERVING.... BUT USE IT'S MEANING FOR THE SAFE PASSAGE OF YOUR BOAT....

Slide #6

LISTED UNDER, "INLAND AIDS," YOU WILL SEE DESCENDING BLOCKS LABELED INTRACOASTAL, WESTERN RIVERS AND UNIFORM STATE.... THIS POINTS OUT THAT ALL SYSTEMS ARE DERIVED FROM INLAND AND THE OTHER THREE HAVE ONLY MINOR DEVIATIONS..... THIS COURSE IS HOWEVER RESTRICTED TO INLAND RULES.....

Slide #7

AS THE ARROW INDICATES WE ARE PROCEEDING FROM SEAWARD TOWARD A BAY AND WE ARE PASSING BETWEEN A RED AND A BLACK BUOY... DO YOU RECOGNIZE THESE AIDS? (PAUSE)...

IF YOU SAID LIGHTED RED AND BLACK BUOYS, YOU ARE CORRECT.... DO YOU RECOGNIZE THE NEXT GROUP OF RED AND BLACK BUOYS? (PAUSE)... DID YOU SAY A RED NUN AND A BLACK CAN? A NUN IS TRUNCATED AND RED.... A CAN IS CYLINDRICAL AND PAINTED BLACK.... NUNS AND CANS ARE NEVER LIGHTED....

Slide #8

DO YOU SEE THE NEXT BUOY WITH THE TOP HALF RED AND THE BOTTOM HALF BLACK WITH A LIGHT ON TOP? WHAT DOES IT TELL YOU? (PAUSE).... DID YOU NOTICE THE SPLIT ARROW? THIS TELLS YOU, THE SKIPPER, THAT YOU CAN FOLLOW THE RIGHT OR LEFT CHANNELS BUT THE PREFERRED CHANNEL IS TO PORT: KEEPING THE TOP RED BAND ON YOUR STARBOARD....

Slide #9

DO YOU KNOW WHAT THIS BLACK AND WHITE VERTICAL MARKED BUOY IS INDICATING? IS IT LIGHTED AND DOES IT HAVE A WHISTLE? (PAUSE).... THIS IS A MID-CHANNEL BUOY... YES, IT IS LIGHTED.... YES, IT HAS A WHISTLE.... YOU MAY PASS ON EITHER SIDE AS THE ARROWS INDICATE.... BLACK AND WHITE MARKINGS OF THIS TYPE ARE ALSO FOUND ON CANS AND NUNS, MAKING THEM MID-CHANNEL MARKERS, ALSO....

Slide #10

THIS GROUP OF BUOYS DOES NOT HAVE ANY SIGNIFICANT LATERAL MEANING.... HOW MANY CAN YOU RECOGNIZE? (PAUSE).... [Move on to slide #11.]...

Slide #11

[Instructor should point out each buoy as narration proceeds].

THE WHITE BUOY SHOWS A SAFE AREA TO ANCHOR... THE YELLOW IS A QUARANTINE ANCHORAGE.... WHITE WITH GREEN TOP TELLS YOU TO SLOW DOWN AND MAKE NO WAKE AS YOU ARE PASSING A DREDGE.... THE BLACK AND WHITE HORIZONTAL BANDED BUOYS ARE USED TO INDICATE A

FISH NET AREA AND YOU SHOULD STAY OUT.... THE ORANGE AND WHITE HORIZONTAL IS A SPECIAL PURPOSE BUOY AND YOU SHOULD LOOK ON YOUR CHART TO SEE WHAT IT IS INDICATING....

Slide #12

HERE ARE TWO ORANGE AND WHITE BUOYS WITH VARIOUS DESIGNS APPLIED TO THEM... WHAT DO THEY MEAN? (PAUSE)... [Go to slide #13].

Slide #13

[Instructor should point out each buoy as he reads about them].
THE TIPPED OVER SQUARE WITH THE TWO ORANGE STRIPES IS A BUOY SIGNALLING THAT THIS IS A DANGER AREA AND TO PROCEED WITH CARE.... THE TIPPED OVER SQUARE WITH THE CROSS IN THE MIDDLE SIGNIFIES THAT YOU ARE APPROACHING AN EXCLUSION AREA AND YOU MUST STAY OUT... IT ALSO HAS TWO ORANGE STRIPES....

Slide #14

THE NUN IS A CYLINDER WITH THE TOP PORTION A TRIANGLE IN PROFILE BUT WITH THE TOP CUT OFF... IT IS THUS TRUNCATED.... THEY ARE PAINTED RED.... NEVER LIGHTED.... THE CAN BUOY IS A CYLINDER WITH A FLAT TOP.... PAINTED BLACK.... NEVER LIGHTED.... BOTH NUNS AND CANS HAVE OR CAN HAVE RADAR REFLECTORS AND GREEN OR RED REFLECTOR PATCHES, RESPECTIVELY.... REMEMBER, WHEN RETURNING (FROM SEAWARD TO KEEP THE RED NUN ON YOUR STARBOARD AND THE BLACK CAN ON YOUR PORT....

Slide #15

LIGHTED BUOYS ALWAYS ARE ON A SMALL TOWER PAINTED EITHER RED, BLACK, RED-BLACK, BLACK-RED OR BLACK-WHITE.... THE FLOATING BASE IS ALWAYS LARGER THAN THE TOP PORTION... THEY CAN HAVE RED, WHITE OR GREEN LIGHTS ON TOP.... ALSO, WHISTLES, GONGS AND SIRENS MAY BE INSIDE THE SUPERSTRUCTURE.... ALL OTHER BUOYS LOOK LIKE CANS WITH SPECIAL COLORS AND MARKINGS.

Slide #16

SOLID RED AND BLACK BUOYS HAVE NUMBERS, OR NUMBERS AND LETTERS IN COMBINATION... THUS YOU CAN IDENTIFY THEM BY LOOKING AT YOUR CHART AND TELL WHERE YOU ARE AT THAT MOMENT.... ALL OTHER BUOYS HAVE LETTERS.... NUMBERALS INCREASE FROM SEAWARD AND ARE KEPT IN SEQUENCE EVEN IF A PARTICULAR BUOY IS OMITTED.... ODD NUMBERS ON PORT SIDE WHEN RETURNING FROM SEAWARD AND EVEN NUMBERS ON STARBOARD....

Slide #17

LETTERS WITHOUT NUMERALS ARE USED ON BLACK AND WHITE VERTICALLY STRIPED BUOYS, RED AND BLACK HORIZONTALLY BANDED BUOYS, SOLID YELLOW BUOYS, AND OTHER BUOYS NOT SOLID RED AND BLACK.... ARE THERE ANY QUESTIONS ON THIS?

Slide #18

WHAT LIGHTS WOULD YOU EXPECT TO SEE ON THESE BUOYS? (PAUSE)... THE RED BUOY CAN HAVE A WHITE OR RED LIGHT... THE BLACK BUOY WILL HAVE A WHITE OR GREEN LIGHT.... THE RED AND BLACK (AND BLACK AND RED) HORIZONTAL BUOYS, IF RED ON TOP; A WHITE OR RED LIGHT AND IF BLACK ON TOP, A WHITE OR GREEN LIGHT.... THE BLACK OR RED BUOYS HAVE FOUR PATTERNS OF LIGHT - FIXED, FLASHING, OCCULTING OR QUICK FLASHING... THE MID-CHANNEL BLACK-WHITE, MORSE CODE "A".... THE BLACK AND REDS USE INTERRUPTED QUICK FLASHING....

Slide #19

HERE ARE ALL THE BUOYS WITH THEIR RESPECTIVE LIGHTS... CAN YOU NOW IDENTIFY EACH ONE? (PAUSE).... ON THE RED, A WHITE OR RED LIGHT.... ON THE BLACK, A WHITE OR GREEN.... WHAT COLOR LIGHTS ARE ON THE NUN AND CAN BUOYS? (PAUSE).... NONE... YOU DO NOT LIGHT A CAN OR NUN....

Slide #20

OBSERVE THE TOP LIGHT (1).... THE CONTINUOUS STEADY LIGHT IS CALLED WHAT? (PAUSE).... FIXED IF IT DOES NOT CHANGE COLOR.... ALTERNATING IF IT CHANGES COLOR.... (ABREV. F. OR ALT.).... THE MIDDLE LIGHT (2).... THE EQUAL SPACED TRIANGLES ARE CALLED WHAT? (PAUSE).... IF THE LIGHT COLOR DOES NOT CHANGE, THIS IS A FLASHING LIGHT.... (ABREV. FL.).... IF THE COLOR CHANGES THIS IS AN ALTERNATING FLASHING.... (ABREV. ALT. FL.).... BOTTOM LIGHT (3).... WHAT DOES THIS LIGHT MEAN TO YOU? (PAUSE)... IF THE LIGHT DOES NOT CHANGE COLOR IT IS OCCULTING.... (ABREV. OCC.)..... AN OCCULTING LIGHT IS TOTALLY ECLIPSED AT REGULAR INTERVALS, THE DURATION OF THE LIGHT IS ALWAYS GREATER THAN THE DURATION OF DARKNESS.... ALL OF THE ABOVE CAN BE RED, WHITE, OR GREEN IN COLOR.... WHEN YOU LOOK AT A CHART IT IS IMPORTANT TO BE ABLE TO IDENTIFY THE VARIOUS LIGHTS, SO WHEN YOU LOOK OVER THE WATER YOU CAN RECOGNIZE THEM.... YOU MUST HOWEVER MAKE USE OF THE LIGHT LISTS....

Slide #21

THIS SLIDE IS OF A FAMILY OF LIGHTS.... NOW, DO YOU REMEMBER #4? (PAUSE).... THIS IS THE FLASHING LIGHT.... THE LIGHT IS ALWAYS ON LESS THAN THE DURATION OF DARKNESS... (ABBREV. FL.).... IF THE COLORS CHANGE IT BECOMES AN ALTERNATING FLASHING..... (ABREV. ALT. FL.).... THE NEXT #5 IS CALLED WHAT? (PAUSE).... THIS IS A QUICK FLASHING.... IT FLASHES NOT LESS THAN 60 TIMES A MINUTE... THESE NEVER CHANGE COLOR.... #6 SHOWS US, WHAT KIND OF A LIGHT? (PAUSE).... THIS IS A GROUP FLASHING LIGHT, IT SHOWS AT REGULAR INTERVALS WITH 2 OR MORE FLASHES... (ABREV. GP. FL.).... IF THE LIGHT CHANGES COLOR IT BECOMES AN ALTERNATING GROUP FLASHING.... (ABREV. ALT. GP. FL.).... LASTLY, #7 SHOULD TELL YOU NOW THAT THIS IS A _____LIGHT..... (ANS)... THIS IS AN INTERRUPTED QUICK FLASHING.... SHOWS QUICK FLASHES FOR ABOUT 4 SECONDS, FOLLOWED BY A DARK PERIOD OF 4 SECONDS.... (ABREV. I. QK. FL.)....

Slide #22

THE #8 LIGHT TELLS YOU THIS IS A _____ LIGHT.... (ANS)... THIS IS AN OCCULTING LIGHT IF THE COLOR DOES NOT CHANGE.... THE DURATION OF LIGHT IS ALWAYS LONGER THAN THE DURATION OF DARKNESS.... (ABREV. OCC.).... IF THERE IS A COLOR VARIATION IT BECOMES AN ALTERNATING OCCULTING... (ABREV. ALT. OCC.).... THE #9 LIGHT IS WHAT KIND? (PAUSE).... THIS IS CALLED A GROUP OCCULTING.... A LIGHT WITH 2 OR MORE ECLIPSES AT REGULAR INTERVALS.... NEVER ANY COLOR VARIATION.... (ABREV. GP. OCC.).....

Slide #23

WHAT WOULD YOU CALL THIS LIGHT #10 (PAUSE).... THIS IS THE SO-CALLED MORSE CODE.... IT IS USED ON MID-CHANNEL BUOYS.... ALWAYS OF ONE COLOR.... (ABREV. MO. (A))....

Slide #24

RADAR REFLECTORS ARE FOUND ON MOST BUOYS TODAY.... THE PLATES ON TOP OF EACH BUOY OFFER A REFLECTIVE SURFACE FOR THE RADAR SIGNAL....

Slide #25

PLUS HAVING RADAR REFLECTORS THESE BUOYS HAVE REFLECTIVE TAPE ADDED ON EACH OF FOUR SIDES.... THIS REFLECTIVE TAPE AIDS THE SEARCHLIGHT BEAM TO REFLECT BACK A STRONGER REFLECTION TO YOUR BOATS POSITION FOR EASIER OBSERVATION.... TAPE COLORS ARE WHITE, RED AND GREEN..... THEY ARE ON THEIR APPROPRIATE COLORED BUOYS.....

Slide #26

SOUND BUOYS ARE BASICALLY BELLS AND WHISTLES MOUNTED ON BUOYS.... A GONG IS A COMBINATION OF BELLS... WAVE ACTION, STORED GASES, AND ELECTRIC BATTERIES ARE THE POWER SOURCES.... THESE BUOYS AID YOU IN FINDING THEM BY THEIR SOUND EMISSION WHEN YOU CAN'T SEE THEM, AS IN A FOG.....

Slide #27

THIS IS A TYPICAL DAYMARK... IT IS FIXED AND THIS ONE IS WARNING OF AN UNDER-WATER JETTY... VERY ACCURATE AS TO POSITION, AS THEY ARE FIXED IN PLACE....

Slide #28

DO YOU RECOGNIZE THESE DAYMARKS? (PAUSE)... WE WILL NOW GO TO THE NEXT SLIDE FOR IDENTIFICATION.... REMEMBER THEY HAVE THE SAME MEANING AS BUOYS, ONLY THEY ARE FIXED....

Slide #29

DID YOU IDENTIFY THESE DAYMARKS?

Slide #30

IS THIS A LIGHTED DAYMARK? (PAUSE)... NO... THIS IS A MINOR LIGHT WITH A DAYMARK BELOW IT... MINOR LIGHTS ARE SUBSTITUTED FOR BUOY LIGHTS, WHEN CONDITIONS ALLOW....

Slide #31

A LIGHTHOUSE IS A DISTINCTIVE STRUCTURE EXHIBITING A MAJOR NAVIGATIONAL LIGHT.... THEY ARE IMPOSING STRUCTURES WITH VERY INTENSE LIGHTS... USUALLY DISPLAYING A COMPLEX LIGHT PATTERN... LIGHTSHIPS ARE VESSELS OF DISTINCTIVE DESIGN AND MARKINGS: EQUIPPED WITH LIGHTS, FOG SIGNALS AND RADIOBEACONS... THEY ARE ANCHORED....

Slide #32

WHEN YOU ARE SAILING DOWN A RANGE, YOU WOULD SEE TWO MARKERS OR LIGHTS, ONE APPARENTLY ON TOP OF THE OTHER... THUS YOU WOULD PASS SAFELY BETWEEN THE TWO SHOALS S AND S'. NOW IF YOUR BOAT MOVED TO STARBOARD WHICH WAY WOULD THE BOTTOM LIGHT MOVE? (PAUSE)... THE CLOSEST LIGHT WOULD MOVE LEFT.... WHICH MEANS YOU

WOULD RUN AGROUND ON THE SHOALS, IF YOU DID NOT STEER TO PORT... WHEN THE LIGHT MOVES BACK UNDER THE TOP LIGHT YOU ARE BACK ON RANGE.....

Slide #33

THIS PLOT IS SHOWN TO INTRODUCE YOU TO OTHER AIDS TO NAVIGATION.... THIS 'RDF PLOT' IS MADE WITH A RADIO-LIKE INSTRUMENT CALLED A "RADIO DIRECTION FINDER." LORAN, RACON AND RADAR ARE ALSO AIDS, BUT MUCH TOO COMPLICATED TO DESCRIBE IN THIS QUICK REVIEW.

Slide #34

THIS IS A PORTION OF A CHART... HERE WE SEE SOME EXAMPLES OF THE REPRESENTATIVE SYMBOLS, LINES, DEPTHS, ETC. FOUND ON CHARTS... SECURE A CHART OF YOUR LOCAL AREA: YOU WILL DISCOVER MANY THINGS YOU DIDN'T KNOW AND THUS BECOME A MORE PROFICIENT BOATER.....

Slide #35

TWO PAGES OF TWENTY-ONE FROM "NAUTICAL CHART SYMBOLS AND ABBREVIATIONS" ARE SHOWN FOR YOUR FAMILIARIZATION OF THE ITEMS THAT MIGHT BE FOUND ON CHARTS.... A MARINE CHART OR RIVER CHART HAS MORE INFORMATION THAN YOU MIGHT EVER NEED, BUT IF YOU HAVE YOUR CHARTS WITH YOU, THEY WILL BE OF IMMENSE HELP TO YOU SOMEDAY... NEVER VENTURE UPON THE WATERS WITHOUT YOUR CHARTS....

Slide #36

HERE ARE A FEW OF THE PUBLICATIONS THAT ARE AVAILABLE TO YOU THE BOATING PUBLIC.... WE STRONGLY RECOMMEND THAT YOU SECURE SUCH BOOKS AND DO SOME ENJOYABLE READING.... BOOK LEARNING MUST BE SUPPLEMENTED HOWEVER BY ACTUAL EXPERIENCE.

AD-A069 150 WYLE LABS HUNTSVILLE ALA F/G 13/10
PLEASURE BOAT COLLISION EDUCATION.(U)
MAY 78 E SAGER, S COHEN, K GEISSLER DOT-CG-40672-A
UNCLASSIFIED MSR-78-10 USCG-D-51-78 NL

2 OF 2
AD A069150

END
DATE FILMED
6-79
DDC

Slide #37

DON'T LET THIS HAPPEN TO YOU.... IMPROVING YOUR SEAMANSHIP, WILL REDUCE THE CHANCES THAT THIS WILL HAPPEN..... NOTICE THE BLACK BUOY OUTSIDE OF THE WRECK....

Slide #38

AS A BOATER YOU'RE OBLIGATED TO KNOW ABOUT THESE NAVIGATION AND PILOTING AIDS....

APPENDIX F-5. SCRIPT FOR 35 MM SLIDE SHOW ON NAVIGATION LIGHTS

TITLE: NAVIGATION LIGHTS - IDENTIFICATION AND USES

Notes to Instructor:

1. Review materials before presentation. The slides are numbered. Be sure they are in the proper order.
2. Where (PAUSE) occurs in the text, this indicates you, the instructor, should wait for the class to respond. before moving on to the next sentence.
3. Before turning on the projector review the classes of boats -
   a. Class A . . . . . under 16'
   b. Class 1 . . . . . 16' to less than 26'
   c. Class 2 . . . . . 26' to less than 40'
   d. Class 3 . . . . . .40' to 65'

Narration:

Slide #1

THE UNITED STATES COAST GUARD AND (insert the name of your organization) PRESENTS. . . .

Slide #2

(No narration)

Slide #3

(No narration)

Slide #4

THE LIGHTS ON YOUR BOAT CONVEY INFORMATION TO OTHERS AT NIGHT AND UNDER RESTRICTED VISIBILITY CONDITIONS.... YOUR LIGHTS ARE DEFENSIVE IN NATURE.... THEY ARE USED FOR IDENTIFICATION AND WARNING, NOT FOR DECORATION.... THE PRIMARY PURPOSE OF YOUR NAVIGATION LIGHTS IS TO PREVENT COLLISIONS WITH OTHER VESSELS.... THIS PRESENTATION

IS BASED ON SPECIFICATIONS FOR LIGHTS ACCORDING TO THE INLAND RULES OF THE ROAD.

Slide #5

CAN YOU RECOGNIZE WHAT HEADING THIS CLASS 1 BOAT IS ON RELATIVE TO YOU IN YOUR OWN BOAT? (PAUSE).

Slide #6

THIS IS A LEFT TO RIGHT CROSSING SITUATION.... WHO HAS THE RIGHT-OF-WAY? (PAUSE).... YOU DO.... AN EASY WAY TO REMEMBER THE BASIC RIGHT-OF-WAY RULES IS GREEN FOR GO: RED FOR GIVE WAY (OR EVEN STOP)....

Slide #7

HOW ABOUT THIS ONE? (PAUSE)....

Slide #8

THIS IS A HEAD-ON APPROACHING SITUATION.... USE YOUR HORN TO SIGNAL YOUR INTENTIONS OR TO RESPOND TO THE OTHER BOAT'S SIGNAL....

Slide #9

IS THIS AN OVERTAKING SITUATION OR A BOAT AT ANCHOR? (PAUSE)....

Slide #10

THIS IS AN OVERTAKING SITUATION BECAUSE THE BOAT IS MOVING AND THE LIGHT IS ON THE STERN.... MANY BOATERS USE THEIR STERN LIGHT AS AN ANCHOR LIGHT.... ON CLASS A AND CLASS 1 BOATS THE STERN LIGHT MAY NOT BE A LEGAL LIGHT.... YOUR PASSENGERS OR THE BOW MAY BLOCK THE LIGHT FROM SHOWING FORWARD.... AN AUXILIARY WHITE LIGHT SHOULD BE MOUNTED ON THE HIGHEST FORWARD PART OF YOUR BOAT AS AN ANCHOR LIGHT, WHICH CAN BE SEEN FROM 360 DEGREES OR 32 POINTS.

Slide #11

DO YOU RECOGNIZE THIS ONE? (PAUSE)....

Slide #12

IN THIS HEAD-ON APPROACHING SITUATION YOU CAN SEE THE WHITE BOW LIGHT, ELEVATED MAST LIGHT AND SEPARATE RED PORT AND GREEN STARBOARD RUNNING LIGHTS WHICH ARE USED ON CLASS 2 OR CLASS 3 VESSELS....

Slide #13

THIS ONE? (PAUSE)....

Slide #14

AN OVERTAKING SITUATION....

Slide #15

THIS ONE? (PAUSE)....

Slide #16

CROSSING LEFT TO RIGHT... YOU ARE THE PRIVILEGED BOAT.

Slide #17

AND THIS ONE? (PAUSE)....

Slide #18

CROSSING RIGHT TO LEFT.... YOU MUST YIELD THE RIGHT-OF-WAY....

Slide #19

WHAT COULD THIS BE? (PAUSE)....

Slide #20

A VESSEL OVER 65 FEET IN LENGTH... NOTICE THAT ITS RUNNING LIGHTS ARRANGEMENT HAS AN AFT 32 POINT WHITE LIGHT, 15 FEET HIGHER THAN THE FORWARD 20 POINT WHITE LIGHT... VISIBLE 5 MILES... THE RED AND GREEN SIDE LIGHTS MUST BE SCREENED FOR 36 INCHES AND VISIBLE 2 MILES.

Slide #21

YOU NEED TO KNOW THE OTHER VESSLE'S BEARING, SIZE AND SPEED IN ORDER TO AVOID A COLLISION, BY GIVING THAT VESSEL SUFFICIENT CLEARANCE.... REMEMBER, YOU DON'T ALWAYS HAVE THE RIGHT-OF-WAY OVER VERY LARGE OR VESSELS OF LIMITED MANEUVERABILITY... YOU NEVER HAVE THE RIGHT-OF-WAY THROUGH THE HULL OF ANOTHER VESSEL.

Slide #22

RECOGNIZE THIS ONE? (PAUSE)...

Slide #23

IN THE CASE OF THIS TUG PUSHING A BARGE YOU MUST BE PREPARED FOR ITS WAKE WHICH CAN SWAMP A SMALL BOAT IF THE SKIPPER IS CAUGHT UNAWARES.

Slide #24

WHAT COULD THIS BE? (PAUSE)....

Slide #25

THIS FERRY HAS EQUAL HEIGHT RANGE LIGHTS AND CARRIES TWO SETS OF RED AND GREEN RUNNING LIGHTS.... ONE SET OR THE OTHER IS USED DEPENDING ON WHICH DIRECTION THE FERRY IS MOVING....

Slide #26

RECOGNIZE THIS ONE? (PAUSE)....

Slide #27

SAILBOATS UNDER SAIL AND NOT UNDER AUXILIARY POWER CARRY SEPARATE RED AND GREEN RUNNING LIGHTS OR A RED/GREEN COMBINATION AND A WHITE STERN LIGHT... A SAILBOAT UNDER SAIL AND POWER OR UNDER POWER ALONE MUST DISPLAY THE SAME NAVIGATION LIGHTS AS A POWER BOAT OF ITS CLASS.... SAILBOATS NORMALLY HAVE THE RIGHT-OF-WAY EXCEPT IN EXTENUATING CIRCUMSTANCES.

Slide #28

WHAT IS THIS? (PAUSE)....

Slide #29

A SMALL SAILBOAT WITHOUT LIGHTS IS SIGNALING YOU IN ORDER TO PREVENT A COLLISION.... SMALL BOATS WHICH DO NOT HAVE LIGHTS MUST CARRY A LANTERN OR FLASHLIGHT TO ALERT OTHER BOATERS IN ENOUGH TIME TO PREVENT A COLLISION.

Slide #30

WHAT COULD THIS BE? (PAUSE).

Slide #31

A BOAT AT ANCHOR DOES NOT DISPLAY RUNNING LIGHTS, ONLY THE WHITE ANCHOR LIGHT WHICH WAS MENTIONED EARLIER.....

Slide #32

MANY TYPES OF LIGHTS ARE USED ON SPECIAL VESSELS SUCH AS DREDGES, CABLE TENDERS, AND SUBMARINES.... THE COMPETENT SEAMAN WILL REVIEW THESE OCCASIONALLY AND SHOULD REMEMBER ONE BASIC IDEA... IF YOU DON'T KNOW WHAT IT IS, GIVE IT PLENTY OF CLEARANCE AND PROCEED WITH CAUTION.

Slide #33

NOW FOR A QUICK REVIEW... REMEMBER THIS ONE? WHO HAS THE RIGHT-OF-WAY? (PAUSE)....

Slide #34

RIGHT TO LEFT CROSSING OF A CLASS 2 BOAT.... THE OBSERVED BOAT HAS THE RIGHT-OF-WAY.

Slide #35

AND THIS ONE? (PAUSE)...

Slide #36

LEFT TO RIGHT CROSSING OF A SAILBOAT UNDER SAIL WITHOUT AUXILIARY POWER... NORMALLY, THE SITUATION WOULD BE THAT THE PORT BOAT FROM THE OBSERVER'S POSITION WOULD GIVE WAY TO THE APPROACHING BOAT BUT SINCE IT IS A SAILBOAT UNDER SAIL, IT HAS THE RIGHT-OF-WAY....

Slide #37

HOW ABOUT THIS ONE? (PAUSE)....

Slide #38

AN INLAND TUG PUSHING BARGES...

Slide #39

THE RULES OF THE ROAD ARE BY STATUTE, FEDERAL AND STATE LAWS.... THEY MUST BE OBEYED JUST AS VIGOROUSLY AS AUTOMOBILE TRAFFIC LAWS ON SHORE....

Slide #40

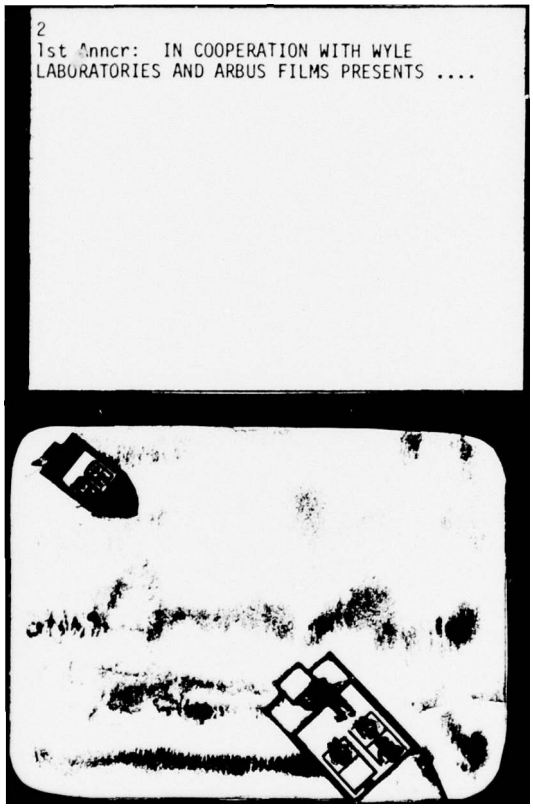
AT TIMES OF EXTREME DANGER YOUR ALTERNATIVE TO THESE LAWS IS TO AVOID AN ACCIDENT, NO MATTER WHAT....

Slide #41

THERE ARE CIVIL AND CRIMINAL PENALTIES FOR NON-COMPLIANCE...

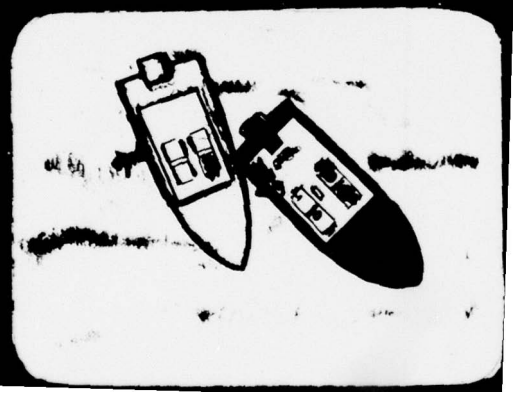
Slide #42

REMEMBER WHEN YOU ARE IN YOUR BOAT ON THE WATER, OTHER BOATERS ASSUME YOU KNOW WHAT YOU'RE DOING: SO YOU ARE OBLIGATED TO KNOW ABOUT IDENTIFICATION OF NAVIGATION LIGHTS AND ABOUT USE OF YOUR OWN NAVIGATION LIGHTS....

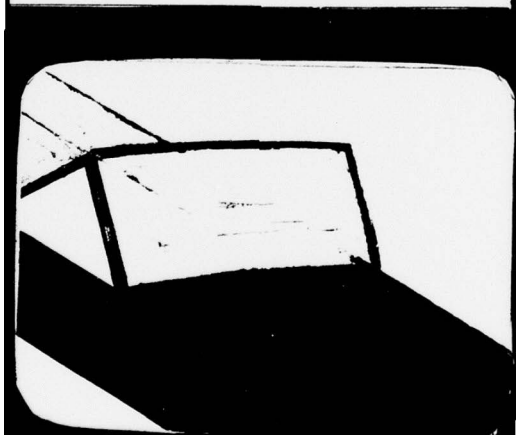

2
1st Anncr: IN COOPERATION WITH WYLE
LABORATORIES AND ARBUS FILMS PRESENTS ....

4.

2nd Anncr: THIS FILM WAS PRODUCED TO BRING TO THE BOATING PUBLIC'S ATTENTION THE IMPORTANCE OF BECOMING A MORE ALERT BOATER. THIS MEANS YOU SHOULD BE CONSCIOUS OF YOUR BOAT'S POSITION RELATIVE TO THE SHORE, THE COURSE OF OTHER NEARBY BOATS AND HOW FAST ARE YOU MOVING. EACH ACCIDENT WILL BE ILLUSTRATED BY MOVING MODEL BOATS AS A RE-ENACTMENT, AND COMMENTS WILL BE GIVEN AS TO PROBABLE CAUSES.



12.
2nd Annor: THE OWNER SCANNED THE AREA FORWARD OF THE BOAT AND TURNED TO TALK TO HIS WIFE. AFTER ONLY A FEW SECONDS, THE BOAT SLAMMED INTO SOMETHING. THE BOW WENT STRAIGHT UP. THE OWNER SAID HE WAS FEARFUL THAT THE BOAT WAS GOING TO COME DOWN STERN FIRST AND FILL WITH WATER. HE ALSO SAID THAT HE THOUGHT THE BOAT SPUN AROUND A COUPLE OF TIMES WHILE IN THE AIR.



14.
2nd Anncr: THE MAN PULLED ONE BOY ONBOARD, THEN ANOTHER BOY. BOTH SEEMED TO BE UNHURT. ANOTHER MAN POPPED TO THE SURFACE ABOUT 8 FEET BEHIND THE BOAT. THE OWNER AND THE MAN REACHED OUT TO PULL HIM IN. THE TWO OTHER MEN WERE GRASPING EACH OTHERS' HANDS WHEN, FOR SOME REASON, THEY LET GO; AND THE MAN IN THE WATER SANK OUT OF SIGHT.

VISUAL IS SAME AS
SCENE 16, SET #1

22.
2nd Anncr: THE SECOND COLLISION ACCIDENT INVOLVES A 16 FOOT RUNABOUT AND A 7 FOOT WATER SCOOTER TYPE PLEASURE VEHICLE. THIS ACCIDENT RESULTED IN THE DEATH OF ONE OF THE TWO PEOPLE ABOARD THE SCOOTER. FIVE ADULTS GATHERED ON A SANDY RIVER BEACH AREA FOR A PICNIC AND PLEASURE BOAT OUTING. DURING THE LONG AFTERNOON THEY CONSUMED 3/4THS OF A BOTTLE OF BOURBON. AT APPROXIMATELY 2030, THE LAST THREE DECIDED TO LEAVE. A MALE AND A FEMALE BOARDED THE SCOOTER WITH THE MALE SEATED IN THE OPERATOR'S POSITION AND WERE HEADED BACK TO THE LAUNCH RAMP.

VISUAL IS SAME AS
SCENE 15, SET #1

23.
2nd Anncr: THE FINAL PERSON BOARDED HIS BOAT AND GOT UNDERWAY SHORTLY THEREAFTER. HE WAS HEADED BACK TO THE LAUNCH RAMP ALSO.

24.
2nd Anncr: AS THE RUNABOUT WAS PASSING, THE WATER SCOOTER APPARENTLY TURNED AND A COLLISION OCCURRED. THE WATER SCOOTER WAS NOT EQUIPPED WITH RUNNING LIGHTS.

VISUAL IS SAME AS
SCENE 16, SET #1

32.

2nd Anncr: AND NOW, CAPTAIN JONES, WE WOULD LIKE TO CONTINUE WITH THE LAST ACCIDENT. JUST BEFORE DAWN, TWO MEN WERE GOING DOWN A RIVER IN A RUNABOUT. THEY HIT AN UNLIGHTED BRIDGE TRESTLE SUPPORT TIMBER. ONE MAN SUSTAINED LIFE-LONG BRAIN DAMAGE.

VISUAL IS SAME AS
SCENE 16, SET #1

34.
2nd Annex: ON IMPACT, THE OPERATOR WAS THROWN FORWARD INTO THE STEERING CONSOLE AND THE PASSENGER WAS THROWN FORWARD INTO THE BENCH SEAT. THE OPERATOR WAS NOT INJURED, BUT THE PASSENGER RECEIVED SEVERE HEAD INJURIES. AFTER THE COLLISION, THE OPERATOR NOTED THAT WATER WAS COMING INTO THE FORWARD SECTION. HE MOVED TO THE STERN WHICH RAISED THE BOW SUFFICIENTLY TO STOP THE INGRESS OF WATER. AS A RESULT OF THE OPERATOR'S BODY COLLIDING WITH THE STEERING WHEEL AND KNOCKING IT ASKEW, THE STEERING CABLE HAD COME UNWOUND. THE OPERATOR THEN HAD TO MANEUVER THE BOAT BACK TO THE LAUNCHING AREA BY HOLDING ON TO THE MOTOR COVER AND STEERING WITH HIS HANDS.

CHECKLIST:

[] _____

ABC's of PFD's

PFD's are the most important piece of safety equipment a boater can have on board. Unfortunately they are often the most non-used, misused or abused items aboard.

By Fay Ainsworth

Smiling flight attendants brief airline passengers about emergency procedures prior to takeoff. Overseas passengers are reminded that inflatable life vests or flotation cushions are stowed under the seat, readily available for any over-the-water emergency.

Even before leaving the dock, cruise ship passengers go through a life boat drill to acquaint them with emergency exit routes, lifeboat stations and the location of their life preservers. Each passenger must don and adjust his personal life vest to prepare him in the event of need.

Commercial whitewater raft trips assign and fit a special Type V Personal Flotation Device to each river runner. Complete adjustments are made on dry land and parents are warned not to allow their children near the raft without their life jackets, even when the raft is tied to shore!

Why all the precautions? Because commercial airlines, cruise lines and river outfitters have to comply with special laws and they want to maintain their current high safety records.

But what about you, the recreational boater? When was the last time you showed your passengers where the life preservers were stowed? Did you help them correctly adjust the fit? If you are like many boaters, you probably neglected to even mention the fact that you had them on board in the event of an emergency.

Nationwide statistics show that 1,264 persons died last year as a result of pleasure boating accidents. The majority of the victims did not have or were not wearing a personal flotation device (PFD) when the accident occured. Studies show that if PFDs had been available fatalities could have been reduced.

Why are PFDs so important? Let's review some common questions and find out.

What is a PFD?

A PFD or Personal Flotation Device is the name given to the more familiar life jacket or life preserver. A recreational boater (that's anyone who doesn't carry paying passengers) is required to obey certain U.S. Coast Guard regulations covering the type and use of PFDs when boating on waters under Federal jurisdiction.

What are those regulations?

If your boat is 16 feet or longer you are required to carry on U.S. Coast Guard approved Type I, II, or III (wearable) PFD for each person on board. In addition, you are also required to carry on approved Type IV (throwable ring buoy or buoyant cushion).

Buy my boat is under 16 feet, are there any regulations covering smaller boats?

Yes. On smaller boats, canoes, and kayaks there must be one U.S. Coast Guard approved buoyant cushion or wearable device (Type I, II, or III PFD) of board for each person.

What do the numbers I, II, III, and IV mean?

All Personal Flotation Devices are classified by their performance types. There are five approved types acceptable for boats of specific lengths. The chart on the next page compares the advantages and disadvantages of the different types and their minimum buoyancy requirements.

What does buoyancy mean?

Buoyancy is the force required to keep something afloat. Flotation depends on reserve buoyancy, that is the excess weight it can support that exceeds the amount of weight it must support. An 'approved' PFD provides a specified amount of buoyancy or extra flotation necessary to keep a person afloat for an indefinite period of time with his head and mouth clearing the water.

What does 'approved' signify?

The United States Coast Guard Office of Boating Safety and the Office of Merchant Marine Safety are charged by congress with the responsibility for the establishment and enforcement of design, construction and manufacturing standards for Personal Flotation Devices. All types of PFDs must undergo extensive testing by independent testing laboratories to verify that certain standards have been met. When a testing organization such as Underwriters' Laboratories recommends approval of a device to the U.S. Coast Guard a manufacturer may add the USCG APPROVED/UL 'Listed' label.

Does that mean not every PFD is approved?

That's right. Only those PFDs bearing a USCG APPROVED label

qualify. Other devices such as inflatable jackets, vests and belts have not been approved because the U.S. Coast Guard has not established testing standards to certify and approve inflatables for use by recreational boaters. Remember, although inflatable devices do not yet qualify as 'approved' PFDs, there is no law to prevent you from using or keeping them on board for extra safety.

Must PFDs be worn at all times?

No. The law only requires that wearable devices must be readily accessible and that throwable devices be immediately available. Common sense suggests that children, elderly persons, handicapped persons and poor or non-swimmers should wear PFDs whenever they are near or on the water. Certain states require that PFDs be worn by children under a certain age and by all non-swimmers. Check your local boating laws to determine your state requirements.

Photo courtesy Maryland Boating

Although this practice is not recommended, grasping an approved Type III float coat can provide support.

Photo courtesy American Outdoorsman

Stay seated when reeling in your catch and watch your balance. This wise angler is wearing a personal flotation device designed for fishermen. Besides being comfortable there are lots of pockets for handy storage.

How often should PFDs be replaced?

All types of PFDs should last for years if given proper care. After every cruise inspect all PFDs for rips and tears. Remove any stains such as oil, gasoline, battery acid and mildew because they can cause straps, fabric and foam to deteriorate. Make sure all buckles and zippers work properly. Pull on all straps to check that they are firmly attached. If the PFDs are wet, dry thoroughly before stowing in a dry, well ventilated place. If you have kapok filled devices on board check them carefully for hard lumps that indicate a loss of buoyancy. Use your hands to compress all sections and listen for the sound of escaping air that may indicate the protective plastic bag has been punctured. Since kapok is a vegetable fiber with a waxlike coating it will mildew and lose its natural buoyancy if water seeps inside the plastic container.

What if I find a damaged PFD?

Don't try to repair it! Discard any damaged PFDs immediately. Cut into small pieces to prevent reuse. Recently a scavenger removed manufacturer's rejects from a waste container and sewed the slashed edges together. He then offered them for sale as 'reconditioned' PFDs—at bargain prices. Don't be deceived. Buy only new, Coast Guard 'approved' PFDs. It's cheap insurance when compared to the loss of a loved one's life.

Must water skiers comply with the PFD requirements?

Yes, any boat pulling skiers must carry one approved PFD for each skier even though the skier being towed is not in the boat. If a skier is wearing an approved PFD, it is not necessary to carry another one in the boat for him.

Are there special PFDs available for children?

Yes, they are designed for persons weighing less than 90 pounds. Within that limitation they have the same flotation capability as adult PFDs. Adults should never wear a child's device and children should never be provided with an adult size except in an emergency. A new device is not available for infants 30 pounds and under.

Why are there special PFDs for infants?

Because young children's heads are proportionately heavier than their body weight traditional types of PFD's force their faces into the water often floating them helpless in a face-down position. The new PFD has a buoyant ring which encircles the babies head. It is held securely in place with a vest that completely covers the child's upper torso. No matter how much wiggling goes on, the device comfortably protects the child until removed by an adult.

Photo courtesy Stearns

This new Type III device is designed to keep toddlers and babies weighing 30 pounds or less safe in or around the water.

To really understand the characteristics of PFDs you should test them before stowing them aboard.

Photo courtesy West Marine Products

Now is the time to determine if your lifesaving equipment meets specified requirements. Let your family experience the flotation qualities of recommended lifesaving equipment. Besides having fun, they'll gain valuable experience on how to react in case there is an emergency.

On a sunny summer afternoon have each family member put on his PFD and adjust the fit. Then the fun begins:

1. Enter the water wearing the PFD. Make certain all cords, straps, and zippers are securely fastened.
2. Assume a face down position in neck deep, calm water such as swimming pool or supervised swim area.
3. Place your face in the water, exhale, and relax. Let your arms and legs go limp and pretend to be unconscious.

4. Mentally note how long it takes your PFD to turn you face upward. (Note: if you are wearing a Type III device the inherrent danger of its not turning an unconscious person face upward will become quite evident.) Check the PFD chart for various turning characteristics.

Here's another test to give you an idea of the flotation characteristics of the various PFDs. Experiencing the feeling of floating in a vertical or slightly backwards position may build confidence in non-swimmers and people afraid of being immersed in the water.

1. While standing in shoulder deep water, lean back and let your knees float off the bottom.

2. Now lean your head back and tuck your knees up and grasp them to your chest with your arms. Try to relax and float in this position. This fetal position helps protect the body's thermal core and helps reduce the loss of body heat by about two-thirds. In water of 35 degrees F to 50 degrees F this "self-huddle" position could save your life from hypothermia. Remember it!

While you are in the water there's one more PFD experience you should try. In order to really understand the difficulty of donning a PFD in the water—try it! It will reinforce the need to adjust PFDs and wear them before getting wet.

Type I — Foam bib life preservers are the easiest and fastest to get into while in the water. Just push your shoulders through the chest straps and your head through the neckhole. Squeeze the front chest sections together and cinch up the front straps.

Type II — Buoyant vests have two straps which makes them a little more difficult to put on in the water. After pushing your head through the neckhole, tie the neck straps and then clip the chest strap.

Type III — Marine Buoyant Devices really should be worn before entering the water and here's why. To put them on you have to put your arms through the armholes, one at a time, otherwise, you must submerge and try to come up inside the coat with your arms outspread. This isn't easy for an inexperienced swimmer!

Type IV — Although Throwable Buoyant Cushions are not designed for wearing there is a proper way to get the maximum buoyancy with the least amount of effort. First enter the water holding the cusion by one strap. **NEVER jump into the water wearing a buoyant cushion!** The impact of you and the buoyant cushion hitting the water together can be very dangerous. Once in the water insert one leg through one strap and push the cushion under your chest before placing the other strap over head and neck. **ALWAYS position the body over the cusion and never wear the cusion on your back since it will force your face into the water!** In a panic situation both arms may be placed through the grab straps and the buoyant cushion may be used as a raft when grasped to the chest.

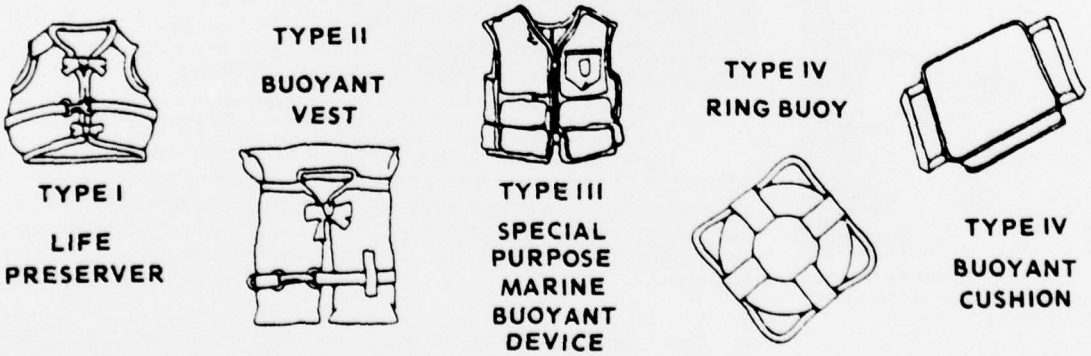
Another method is to put one leg through the strap and then place the opposite arm through the other strap. Remember buoyant cushions are extra flotation devices designed to be thrown to someone struggling in the water. They should be stowed in a convenient and accessible place—ready for any emergency.

Practice throwing Type IV devices both with and without a 25 to foot line attached. Float an empty plastic container in the water and use it as a practice target. Have each family member practice holding the coiled line, tossing and retrieving the ring buoy or buoyant cushion. Caution everyone to be careful and not "hit" the target but to throw the device beyond the "victim" and then pull it within reach. Hitting someone in the water could be dangerous. Remind participants that although a line attached to a Type IV device may reduce the distance it can be thrown, it greatly improves the probability of rescue. Cushions or ring buoys without line attached should be thrown as close to the victim as possible. Remember not to "hit" the target.

And while you're floating around in the water remember a PFD is not a substitute for good swimming ability, it is merely an aid to keep you afloat. The basic ingredient of water safety is knowing how to swim, so learn about swimming and know your limitations.

PFD's when worn can help provide you and your passengers with "protection from drowning".

TYPES OF PERSONAL FLOTATION DEVICES



COMPARISON OF U.S. COAST GUARD APPROVED PERSONAL FLOTATION DEVICES

TYPE	PRIMARY USE	ADVANTAGES (Flotation - Visibility - Wearability - Comfort)	DISADVANTAGES
TYPE I **Life Preservers** Kapok filled and plastic foam bibs. Made of fibrous glass and/or unicellular foam.	Designed to turn an unconscious wearer from a face-down position in the water to a face-up or slightly backward position. Recommended for offshore cruising. Acceptable for all size boats.	Red or orange color makes for good visibility. Good flotation has more than 20 pounds of buoyancy. Five to nine pounds over minimum requirements. Keeps wearer's head and shoulders out of the water. Provides four to six inches of above the water mouth clearance for breathing. Should turn wearer face up in one to three seconds.	Bulky construction restricts normal movement out of water. Wearer's head is pusned slightly forward due to extra flotation around collar. This could become uncomfortable. Be careful that the jacket is positioned properly with the waist straps tightly cinched. Sometimes synthetic straps will slip when wet even when double knotted.
TYPE II **Buoyant Vest** Kapok or Plastic foam bibs. Foam-filled vests.	Designed to turn an unconscious person from a face-down to a face-up vertical or slightly backward position. Acceptable for all recreational boats. Recommended for closer inshore cruising.	Must have at least 15.5 pounds of buoyancy. Should turn an unconscious wearer face up in about five to six seconds.	Slightly less buoyancy than Type I. Wearer's mouth is closer to the water's surface. When the neck rests against the back cushion the shoulders barely break the water's surface. In rough water waves could occasionally cover the face. Out of the water foam bibs are less comfortable than the soft kapok bibs. Kapok bibs can cause chafing around the neck. The smooth plastic surface of the plastic bibs can become wet and uncomfortable in hot weather.
TYPE III **Special Purpose Marine Buoyant Devices** Foam-filled vests Foam ski vests Sleeved jackets or Float coast. Foam-filled vests	Designed to keep a conscious person in a vertical or slightly backward position in the water. Recommended for in-water sports, or on lakes and close inshore operation on confined bodies of water such as lakes and impoundments. Acceptable for all size boats.	Designed to be worn Type IIIs feature trim good looks, snappy colors, fashionable and functional styling. Type III devices have the same buoyancy (at least 15.5 pounds) as Type II but they have a lesser turning ability to allow for a more comfortable design. Sleeved float coats not only help keep the wearer warm out of the water but if the person goes overboard they help insulate the body against heat loss while keeping the person afloat. This built-in hypothermia protection helps to increase cold water survival time. Float coats can provide a feeling of stability while floating if the arms are held away from the body.	Wearer must be conscious and make an effort to assume a slightly backwards position since Type IIIs have a tendency to float an unconscious wearer face down. Since they are not designed to keep the wearer's head out of the water persons leaning backwards trying to maintain a relaxed floating position will often have their ears and forehead covered with water. Wearers floating in choppy waters may have only three inches of mouth clearance. Thus they should not be used by non-swimmers who might panic when their face and head is continuously immersed in water.

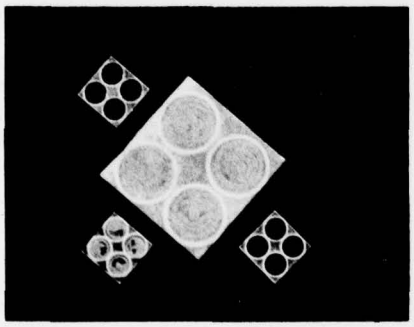
COMPARISON OF U.S. COAST GUARD APPROVED PERSONAL FLOTATION DEVICES

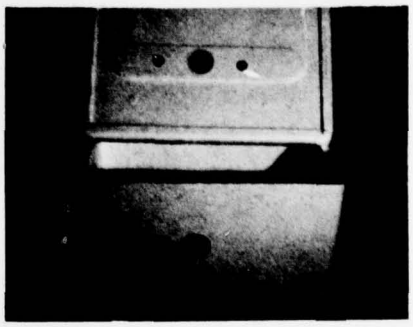
TYPE	PRIMARY USE	ADVANTAGES (Flotation - Visibility - Wearability - Comfort)	DISADVANTAGES
TYPE III (Con't.)		The foam filled sports vests and float coats are popular year a round. The variety of functional designs some with extra pockets and special camoflauge colors are available for hunt ing and fishing. For greater weara bility during hot sum mer days many sports vests have a full nylon mesh lining for extra body comfort. Adjustable laces allow for comfortable wear ing over bulky clothing. Some childrens' models have leg straps to prevent the vest from riding up. An adjust able waist strap also helps eliminate this problem.	Since sleeved jackets are difficult to swim in, wearers may tire more easily. Float coats are too hot to wear during warm weather. They are also very heavy when climbing out of the water since they absorb excessive amounts of water. If not properly zipped and fitted to the wearer float coats will often ride up about the waist when floating. The solu tion to this problem is to lean backwards and pull the jacket down below the waist. Type III vests with side lacing straps should be firmly tied to fit the wearer; otherwise they can slip up. Smooth plastic surfaces of ski vests may become slimy in hot weather. This discourages out of water wearing while boating. Some Type IIIs have poor visibility.
TYPE IV **Buoyant cushions** **Ring Buoys**	Designed as a rescue device to be thrown to a person in the water. Acceptable for boats less than 16 feet and canoes and kayaks. There must be at least one on board any boat over 16 feet.	All Coast Guard ap proved ring buoys are fitted with a grab rope. They have good visibility since they are either white or orange. Both cushions and ring buoys are designed to be grabbed by per sons in the water. Buoyant cushions must be at least two inches thick and have at least 225 sq. inches of top surface. Ring buoys should be mounted on brackets where they will be im mediately available when needed.	
TYPE V **Special Purpose Devices** not classified else where.	Open classification to provide consideration for approval of devices designed for a speci fic and restricted use where circumstances indicate none of the other types are suit able.	For example commer cial whitewater rafts carry a special Type V vest which provides 22 pounds of buoyancy.	

APPENDIX F-8. PHOTOGRAPHS OF ADVERTISING SPECIALTIES FOR LOADING-RELATED AND COLLISION ACCIDENT EDUCATION

Sample floating key chains for boat ignitions:

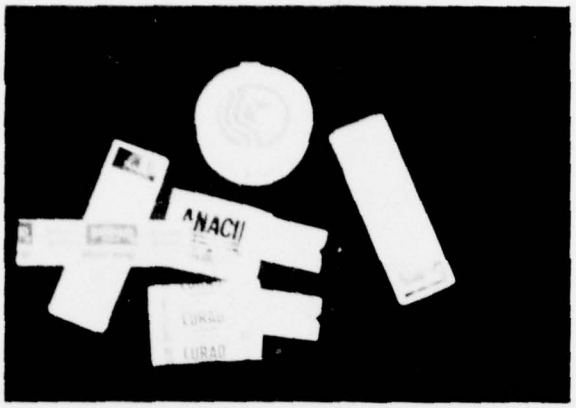
Sample reflective stickers:



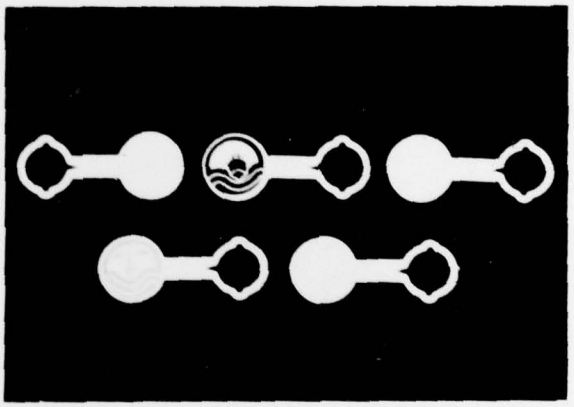


APPENDIX F-8.

Samples of First Aid Kits and Band-Aid Dispensers with Educational Logos:



Sample Beverage Accessories with Educational Logos:



APPENDIX F-9. SCRIPT FOR RADIO SPOTS (30 SECONDS)

(SFX: OUTBOARD MOTOR REVS UP ... DRIVES OFF INTO DISTANCE)

IF YOU'RE A BOATER, THIS SOUND IS MUSIC TO YOUR EARS. THIS SOUND SHOULD STRIKE TERROR IN YOUR HEART... (SFX: SOUNDS OF HEAVY WATER SLOSHING AND WOMEN AND CHILDREN'S SCREAMS, [FADE SFX])... WOULD YOU KNOW EXACTLY WHAT TO DO IN CASE YOUR BOAT CAPSIZES? IF NOT, BE SURE TO FAMILIARIZE YOURSELF AND EVERYONE THAT RIDES IN YOUR BOAT WITH SAFETY PROCEDURES TO FOLLOW IN CASE YOUR BOAT SWAMPS OR CAPSIZES. ALWAYS STAY WITH YOUR OVERTURNED BOAT AND DON'T PANIC. FOR MORE INFORMATION ON BOATING, CONTACT THE COAST GUARD AT 1-800-594-6000.

(SFX: SOUND OF MOTORBOAT... WATER SLOSHING [SLOW FADE OF SFX])

IF YOU'RE A BOATER, YOU KNOW HOW MUCH FUN IT IS TO GO BOATING. NO DOUBT YOU'VE HAD A FEW MINOR INCIDENTS ON THE WATER THAT COULD HAVE BEEN SERIOUS. YOUR QUICK THINKING PROBABLY SAVED THE DAY. A REMINDER FROM THE U.S. COAST GUARD TO KEEP YOUR GUARD UP ALWAYS. NEVER ALLOW TOO MUCH NOISE, TOO MUCH SUN, TOO MUCH FUN, OR TOO MUCH ALCOHOL TO WEAKEN YOUR SENSES. WHEN YOU'RE IN YOUR BOAT OR IN THE WATER, STAY ALERT AND STAY ALIVE. FOR MORE INFORMATION ABOUT BOATING, CALL YOUR U.S. COAST GUARD AT 1-800-594-6000.